A SYSTEM OF PRACTICAL MEDICINE

COMPRISED IN

A SERIES OF ORIGINAL DISSERTATIONS.

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VOL. V.

LONDON:
WHITTAKER AND CO, AVE-MARIA LANE.
MDCCCXL.

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HÆMORRHAGE.

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Hæmorrhage (αἱμοῤῥαγία, from αἷμα, blood, and ῥήγνυμι, I burst or break). The term Hæmorrhage thus signifies the bursting forth of blood from the living body; the escape of the blood from those vessels in which it is always contained in a healthy state of the system.

In the present day a very large class of important diseases is collected together, and described under this title, *Hæmorrhage*, whether the extravasated blood escapes from the body by some of the natural external openings, or remains pent up in some closed cavity or viscus: whatever may be the cause of the extravasation of the blood, still the morbid phenomenon would in the present state of medical science be classed among the hæmorrhages. It frequently happens that a very considerable loss of blood is sustained in consequence of some accidental injury of the arteries or veins, or by ulceration of their coats; whenever the vessels so injured, or the trunks from which they arise, are within the scope of the senses of sight and touch, the surgeon is called upon to arrest the hæmorrhage by the application of the ligature. It is not our intention in the present article to consider any of these forms of hæmorrhage, which more properly belong to the province of surgery, but simply state that all these hæmorrhages, which are consigned to the care of the surgeon, are the result of appreciable injury of the bloodvessels. Those forms of hæmorrhage, which are usually committed to the care of the physician, are much less perfectly understood: they frequently take place without any perceptible alteration in the anatomical condition of the part whence the blood escapes; and are therefore controllable with less facility and certainty. They arise from some pathological condition of the body itself, and may be entitled *spontaneous*. The history and treatment of these spontaneous hæmorrhages are detailed in the following article.

Upon some occasions a sudden hæmorrhage appears to constitute a whole disease; that is, it is the only morbid phenomenon that we can detect: at other times it forms the principal sign or indication of local disease; while, lastly, an escape of blood may be merely an accidental symptom.

There is scarcely a structure of the body which may not suffer from the spontaneous effusion of blood from its vessels. Hæmorrhages are of frequent occurrence from the mucous membrane of the nostrils, pharynx, trachea and bronchi, stomach, intestines, urinary organs and uterus: they are more uncommon from the serous coverings of the lungs, heart, brain, and the abdominal organs: they take place into the cellular tissue in many parts of the

body: they occur in the parenchyma of the brain, the lungs, the liver, and the testicle: they likewise take place into the substance of the skin as well as from its free surface.

It will be interesting, and productive of a better understanding of the pathology of hæmorrhages, if we first consider the conditions under which the blood escapes from the vessels of the different tissues. It is true that hæmorrhage from some of the before-mentioned organs, as the stomach, the intestines, the lungs, and the brain, does occasionally result from the rupture of some vessel or vessels of cognisable magnitude; but it is no less certain that, in by far the greater number of these spontaneous hæmorrhages, there is no lesion of structure, either of arteries or veins, so far as the most careful dissection informs us. From the earliest dawn of medical science it must have been known, that the accidental division of a bloodvessel was attended with loss of blood; and hence the older pathologists, prior to the cultivation of morbid anatomy, reasoned by analogy, that wherever an effusion of blood occurred in the living body there must be a rupture of a bloodvessel. It was by careful dissections that Morgagni demonstrated that this notion was in many instances erroneous; and subsequently Bichat (*Anat. Gén.*) promulgated and established the now generally received pathological doctrine, that the great majority of these spontaneous hæmorrhages are the result of an exhalation from the ultimate ramifications of the minuter bloodvessels, which constitute the capillary system. Andral (*Précis. de Pathol. passim*), Chomel (*Dict. de Méd.* art. HÆMORRHAGIA), and other pathologists of more recent date, have illustrated and firmly established this doctrine of hæmorrhage by exhalation; and Dr. Watson, in a most perspicuous article on hæmorrhage, has given an able digest of the observations and arguments by which this doctrine is supported. Judging, he says, from the writings and language, even of medical men, it does not appear to be so generally known or acknowledged as it ought to be among *them;* and among unprofessional persons, the old errors upon this subject prevail almost universally. To break or burst a bloodvessel, in the most literal meaning of those words, is thought by the public, and by some at least of the profession, to be a misfortune of very common occurrence; yet, relatively to the frequency of hæmorrhage, it is certainly a very rare one. (*Cyc. Pract. Med.*) The opportunity here afforded of dissipating a widely entertained error ought not to be neglected, and we shall therefore not hesitate to reproduce the principal arguments by which the doctrine of hæmorrhage by exhalation is supported. As hæmorrhages from mucous membranes are far more frequent than from other tissues, so will they afford us the readiest means of establishing this principle in pathology. Thus, where hæmorrhage has occurred so profusely from the stomach or bowels, that the death which ensued has been sufficiently accounted for by the mere loss of blood, the whole tract of the alimentary canal has been diligently examined, and has exhibited no breach of surface, nor any perceptible alteration of texture. Sometimes the mucous membrane appears, here and there, of a red colour, and, as it were, surcharged with blood; sometimes it is pale and transparent, while the vascular network, visible immediately beneath it, is gorged and turgid: sometimes the whole is colourless, the same network of vessels having been completely emptied by the previous hæmorrhage; and sometimes, again (and this is illustrative of the mode by which the blood has issued) vast numbers of small dark coloured masses, like grains of fine sand, can be made to start from the surface of the membrane by slight pressure. There can be no doubt that these are minute portions of blood, which had remained and coagulated in the vessels or apertures forming the ultimate channels of the hæmorrhage. (Watson, *op. cit.;* Andral, *op. cit.* vol. ii. p. 151.)

Bichat places in the foremost rank this species of evidence, by which alone, after all, the existence of hæmorrhage, independent of any rupture of vessels, can be satisfactorily established. He states, that he had often opened the bodies of patients who had died during an attack of hæmorrhage, and that he had had the opportunity of examining, with reference to this very point in pa-

thology, the surfaces of the bronchial tubes, of the stomach, of the intestines, and of the uterus; that there never was the least apparent trace of any laceration or lesion of those membranes, although he took the precaution of carefully washing their entire surfaces, of allowing them to macerate in water, and at the same time of examining them with powerful lenses. (*Op. cit.*)

Numerous and conclusive observations of a similar kind might be cited from the records of morbid anatomy, which is so extensively cultivated in the present day; and in this way direct proof is obtained, not only that hæmorrhage may take place from the surfaces of internal mucous membranes by exhalation, but that this is the mode in which it most commonly happens; that the effusion of blood by any of the natural outlets of the body can seldom be explained by the detection of any rupture of the coats of a bloodvessel.

Bichat also supported this doctrine of hæmorrhage by exhalation by the following considerations, which, although full of physiological interest, are by no means so convincing as the former. He states that if the uterus of a female who dies during menstruation be carefully examined, we cannot discover either any actual erosion of vessels, or any of those scars which ought to be so numerous, if at each menstrual period the uterus were really the seat of so many successive lacerations of its internal membrane. Such lacerations, if they took place, would indeed account for the bloody discharge, and some suppose them to take place in other membranes whence blood has been poured forth. It is by no means certain, however, that such lesions of surface, especially in mucous membranes, would leave permanent traces of scars. Punctures even of the skin, made by fine needles which wound the bloodvessels, do not, we believe, leave any marks of their former presence. Bichat adds, that if the same uterus be submitted to pressure, and the surface be carefully watched, we see minute drops of a bloody fluid exuding from the exposed membrane: and if we then wipe away this fluid, the surface of the membrane, which has yielded the bloody fluid, is discovered to be unbroken. (*Op. cit.*)

Whatever support the doctrine of hæmorrhage by exhalation derives from the phenomena of menstruation, the following interesting case, observed by Dr. James Hamilton of Edinburgh, affords it in the most striking manner. A woman was afflicted with enlargement and complete prolapsus of the uterus. The inverted womb is described as having hung down between her thighs as large as a quart bottle; it could not be replaced; it was tense and hard, except during the periods of menstruation, which took place regularly. At those times it became soft and flexible, and the menstrual discharge was seen by numbers of medical men and of students to issue guttatim from the exposed surface. (*Cyc. Pract. Med.* art. HÆMORRHAGE.) As, however, Dr Watson remarks, the process of menstruation cannot be looked upon as a morbid process; as in the unpregnant female, during a certain portion of her life, it is not only consistent with perfect health, but actually essential to it; and as the fluid so poured out is not strictly blood, the analogical argument drawn from the preceding facts in favour of hæmorrhage by exhalation, though it may afford a strong presumption, is not decisive.

But any deficiency in the cogency of the two preceding arguments is supplied by the careful observation of those rare but well-authenticated cases of cutaneous hæmorrhage, where a dew of blood appears upon some part of the surface of the body, and which, being wiped away, again appears, without any perceptible change in the bleeding surface beyond a blush of redness.

But it is not only from the observation of mucous membranes and the skin pouring forth blood from their surfaces, that we are assured that hæmorrhage takes place by the process of exhalation. Bichat states that he had upon many occasions scrupulously examined the internal surface of the peritoneum, of the pleura, and of the pericardium, in cases of hæmorrhage from those membranes, and that their surface appeared to him entirely free from any laceration, so that it was very evident to him that the exhalants had poured forth the blood in place of the serum which they previously secreted.

If it be demonstrated, says Chomel, that there does not exist any rupture of the bloodvessels in these cases of hæmorrhage from the mucous and serous membranes and the skin, there remains open to us, in the present state of medical science, only one mode of explaining the escape of the blood; it can only take place through the same channels as pour forth the mucus, the serum, and the sweat. (*Dict. de Méd.*) There seems no more necessity, under the action of disease, for a rupture of vessels to give exit to the blood, than to give exit to these fluids. What the vessels or outlets to which we give the name of exhalants are, how they are distributed and arranged, in what manner they are connected with the ordinary capillary circulation of red blood, or under what influences they are placed, are points concerning which we have little or no certain knowledge. We know, indeed, that such channels must exist, though we cannot see or demonstrate them; and that whilst the health is good, they do not allow the blood, as such, to pass through them. Having thus produced facts and arguments which, as we believe, establish the truth of the doctrine of hæmorrhage by exhalation, it would seem that this class of diseases should be regarded as analogous to morbid secretions, and in any nosological arrangement be placed in the same class with dropsies and mucous discharges, and it is in this light that they have been regarded by Andral. (*Op. cit.*)

Spontaneous hæmorrhages are symptoms of very different morbid states: sometimes the effusion of blood is a sign of general constitutional disturbance; sometimes merely of a local affection.

Those hæmorrhages which may be termed *constitutional* are attended by very opposite symptoms; and hence pathologists have long been in the habit of dividing these into *active* and *passive* hæmorrhages. Hæmorrhage also occurs as a symptom of very different local affections. Thus we witness hæmorrhage which obviously arises from some disease of the organ whence the blood is poured forth; and this may be termed *symptomatic*: again, we have a similar hæmorrhage taking place in consequence of obstructed circulation of the organ, produced by disease in some other part; and this may be designated *sympathetic*. In every hæmorrhage, from whatever part it may take place, the practitioner has to consider whether it be a symptom of constitutional or local derangement; whether the constitutional symptoms are of an active or passive nature; or lastly, if the affection be local, then whether it is to be regarded as symptomatic or sympathetic. We believe that the successful treatment of this class of diseases will mainly depend upon their accurate diagnosis in the first instance. We admit that in practice this is sometimes attended with considerable difficulty.

The foregoing arrangement of the spontaneous hæmorrhages differs in some respects from that adopted by authors of undoubted merit, as Chomel, Watson, Latour, &c. We do not ascribe much importance to any nosological classification, but are of opinion that hæmorrhages may be clearly ascertained to occur, 1. as symptoms of constitutional disturbance independent of local lesions, and, 2. as symptoms of manifest changes of structure in different organs.

Diagnosis. Although the escape of blood from the vessels is a phenomenon so striking, that in the greater number of instances there can be no doubt about the source of the hæmorrhage, still, when the blood is not immediately ejected, either in consequence of its traversing some long canal, or from being poured out into some part which does not communicate with the surface of the body, it may be difficult to decide upon the real nature of the case. Our diagnosis is then formed mainly from the constitutional symptoms which accompany copious losses of blood, together with the signs of local distress, particularly such as are induced by pressure. But a far more frequent and important difficulty arises when the physician attempts to decide, whether the hæmorrhage is to be regarded as constitutional, or symptomatic of some local disease. This difficulty is sometimes so great, that the prudent practitioner generally suspends his judgment for a time, until he can learn more of the history of the case, and observe the further progress of the symptoms, both local and general.

With respect to the quantity and quality of the blood poured forth in spon-

taneous hæmorrhages, nothing can be stated with precision. The quantity may vary from a few drops to several pints; but when there is a succession of hæmorrhages at short intervals of time, the quantity lost is sometimes quite astonishing. Patients, however, generally overrate the quantity effused upon any one occasion.

The blood itself is generally more fluid and brighter in proportion as it is effused rapidly, in large quantity, and near the surface of the body; more coagulated and darker in colour in proportion to the length of time that it has remained within the body after its escape from its proper vessels. The condition of the blood rejected will however materially depend upon the organ whence it is effused, and even assists in determining the diagnosis.

Constitutional hæmorrhages. These hæmorrhages often appear to be the result rather of some peculiarity of constitution, than of any pathological condition of the system; they take place in the most robust as well as in the most delicate; sometimes they are confined to one organ: in other cases the effusion of blood is from many different parts of the same individual in succession, *viz.* from the nostrils, the bronchi, the stomach, the intestines, the uterus, or the skin. These constitutional hæmorrhages occasionally assume a periodicity almost as regular as that of menstruation; when they recur periodically, it is generally at intervals of a month, and the blood is usually poured forth with great regularity from the same organ, most frequently from the rectum or nostrils. At each recurrence of hæmorrhage a train of peculiar premonitory symptoms may often be detected; the discharge lasts a given time, and the quantity of blood lost is pretty nearly the same. If an habitual periodical hæmorrhage be interrupted, we generally find that some derangement of the health is either the cause or the effect of the intermission. These periodical hæmorrhages seldom continue throughout life, and in this respect they closely resemble the phenomena of natural menstruation: in the great majority of cases they do not commence before puberty, and they either cease or appear at longer intervals in the latter periods of life. As their accidental interruption may always be regarded either as a cause or effect of disordered general health, so when they become excessive they must, like profuse menstruation, be regarded as indications of disease. When these habitual periodical hæmorrhages have been accidentally arrested, we sometimes observe, sooner or later, a very remarkable and interesting physiological phenomenon, *viz.* the appearance of a hæmorrhage in some other part of the body, and from which it continues to recur periodically. Such hæmorrhage is often spoken of as vicarious. Thus, if habitual hæmorrhois be interrupted, the person will perhaps be seized with periodical discharge of blood from the bladder, the stomach, the nostrils, or more rarely from the bronchi. Here, again, we may trace a close analogy between habitual hæmorrhages in the male and natural menstruation in the female. The celebrated Dr. Gall used strenuously to maintain the doctrine of a periodic movement in the male system, analogous to that which returns monthly in the female, and marked by signs which all might detect, who would take the pains to look for them. That the analogy really obtains in some point, and more distinctly in some individuals than others, the foregoing observations clearly indicate.

Whenever we meet with periodical hæmorrhages in the female from any organ but the uterus, it is generally found upon investigation, that such discharge of blood is supplemental of suppressed menstruation, and continues with great regularity until the uterus has resumed its healthy functions. These supplemental or *vicarious* hæmorrhages commonly take place by the same organ on each occasion; sometimes, however, by different organs. It is almost always in this supplementary manner that the rarer forms of hæmorrhage are met with, and particularly those from the skin. Indeed, the only instance of cutaneous hæmorrhage which has fallen under our observation, was in a case of amenorrhœa. A predisposition to hæmorrhage from various parts of the body, upon the receipt of slight injuries, sometimes appears to be a family

peculiarity, which, like many others, may be hereditary. One of the most remarkable cases of this kind is cited by Andral. In a family consisting of five children, all boys, the eldest accidentally bit his tongue, when the hæmorrhage which took place from the wound was so excessive, that the child died from loss of blood: the third and fifth of these boys had the same unfortunate tendency to hæmorrhage; the second and fourth boys, on the contrary, were remarkably healthy.

The third boy at the age of five years, and the fifth at fifteen months, were at various times affected with an eruption on the thighs and legs of livid spots or patches; these gradually swelled to the size of a pigeon's egg, and then became of a greenish yellow colour. No bleeding took place from these swellings, unless they were accidentally or intentionally opened, when hæmorrhage occurred, and the flow of blood did not cease until the little sufferer fainted. The blood which escaped at first was red, but before it ceased became more like water stained with blood, and then the livid spots disappeared. Pressure with the fingers on the wound continued for several hours, was sufficient to repress further hæmorrhage; but it was observed that a real coagulum never formed to close the wound. These children recovered the loss of blood very slowly; but they continued otherwise healthy, until the hæmorrhage was accidentally renewed.

The elder of these two boys once lost a considerable quantity of blood from a decayed tooth; the younger had not the hæmorrhagic constitution to such an extent. Neither of the parents nor any relatives of these boys suffered in a similar manner. (*Bull. des Sciences Méd.* Avril, 1828.)

There are other hæmorrhages which are entitled to be considered constitutional, and which are preceded and accompanied by symptoms indicating derangement of the several functions of nutrition, of circulation, and of the nervous system; they are more strictly pathological than the foregoing. Some of these are attended with signs of fulness of blood, or plethora, and by increased activity and power of the circulation. These constitutional hæmorrhages have been usually described as *active*, while other hæmorrhages are accompanied by symptoms of constitutional debility, with an impoverished and altered condition of the blood, with diminished powers of circulation. These hæmorrhages have been contra-distinguished from the former by the title of *passive.*

It is not our intention to assert, that all constitutional hæmorrhages must necessarily belong to one of the two foregoing orders. Several varieties of hæmorrhage have already been pointed out, as arising rather from peculiarity of constitution than from actual disease; but whenever the hæmorrhage is an accidental occurrence, and attended by symptoms of general constitutional disturbance, it will be found to bear the characters of the active or passive forms of disease. In well-marked cases, the distinctive characters of these two forms of constitutional hæmorrhage are sufficiently decided. They have been dscribed by Chomel in nearly the following words: — *Active hæmorrhages* occur in persons who are young and robust, who live fully, who make blood fast, and who are subject to the influence of those causes which tend to produce plethora. Occasionally the hæmorrhage can be traced to some sudden accidental exciting cause, as violent exercise, mental emotions, a large meal of stimulating food, great heat of the atmosphere, a sudden chill of the surface of the body, or any other cause which may increase the force and frequency of the heart's action, or which may repel the blood from the surface upon some internal organ; more frequently, however, the hæmorrhage seems to be the consequence of the predisposing causes merely. (*Dict. de Méd.*)

The actual escape of blood is generally preceded by a train of peculiar symptoms. The person experiences a general feeling of indisposition, with obscure and wandering pains that gradually settle in the part from which the blood is about to be discharged; the face flushes, and sudden heats come over the surface of the body; the pulse is generally frequent, full, bounding, or jerk-

ing, often accompanied with a peculiar thrill, which characterises the tendency to hæmorrhage, so that this kind of pulse has sometimes been called a hæmorrhagic pulse.

A series of local symptoms, such as sensation of weight, of distension, of tingling or heat, is felt in the part, which, if it be within the scope of observation, sometimes appears red and swollen; there is increased force of the arterial pulsations, and turgescence of the veins, indicating an unusual afflux of blood towards that part of the body whence the blood is about to escape; while chilliness, paleness, and shrinking of distant parts, as of the hands and feet, denote an opposite state of the circulation in them.

In active hæmorrhages the blood commonly escapes with rapidity: it is of a florid red colour, and has the characters of what is vulgarly termed rich healthy blood; it rarely proceeds from more than one part; it readily coagulates, though it seldom separates completely into crassamentum and serum. In proportion as the blood continues to flow, the signs of local congestion or hyperæmia disappear; the person is sensible of relief, and feels stronger, more lively, and less oppressed than before; the heart ceases to act with inordinate force; the pulse regains its freedom and natural condition; and the circulation becomes more equable through the extremities.

This kind of hæmorrhage is, as has already been mentioned, its own remedy, and ceases after the discharge of a certain quantity of blood. Should the quantity lost be excessive, then we witness the usual train of symptoms resulting from great loss of blood.

Passive hæmorrhages are characterised by symptoms and consequences of an exactly contrary nature. They occur in individuals who are naturally feeble, or who are weakened by disease, fatigue, imperfect nourishment, or profuse discharges. The flux is not preceded by constitutional excitement, nor followed by any relief, but, on the contrary, by an aggravation of the general symptoms. The effused blood is generally dark, serous, and little disposed to coagulate; it would be commonly described as poor blood; it often oozes slowly for a considerable period, and from several organs at the same time. If the quantity of blood lost be considerable, the previous debility is greatly aggravated; the activity of the heart is not diminished; the face, the lips, the tongue become pale; the complexion assumes a peculiar waxen tint, and the surface of the body loses its temperature. The hæmorrhage thus leaves the individual in a worse state, and does not suspend the further escape of blood; indeed, passive hæmorrhages both resist the means of cure, and are more likely to recur in proportion as they have been profuse, or have continued for some time.

We shall now proceed to indicate those conditions which appear most favourable to the occurrence of either form of constitutional hæmorrhage, and thence direct attention to the most probable explanations of the cause of the escape of the blood. We have already stated, that active hæmorrhages occur in persons who are exposed to the influence of those causes which tend to produce plethora. To understand precisely what is meant by this state of general plethora, it is necessary to remember the physiological doctrine, that the whole vascular system is constantly distended beyond the caliber of the vessels when free from any distending force. When the flow of blood through the arteries is diminished, their caliber contracts, and frequently they become even impervious. The correct notion of plethora is, that this state of distension of the vascular system is greater than what it is presumed to be in health. It is easy to perceive, that in persons who live fully, and who lead an inactive life, there should be a greater quantity of blood formed, and consequently a preternatural distension of vessels.

Fulness of habit and a florid complexion are some of the more obvious marks of the existence of general plethora. We also trace its effects in the tendency to local capillary congestions or local hyperæmia, to inflammation, and, lastly, to hæmorrhage. The frequency of local congestions, combined with local hæmorrhage in plethoric individuals, gives support to the hypothesis,

that, in the so called spontaneous active hæmorrhages, the issue of blood results from pressure, whereby the entire blood is urged through passages, naturally impermeable by its coloured globules, but now mechanically dilated, in consequence of the *vis à tergo*. Although the dilatation of the pores in the walls of the capillary vessels cannot be made evident to the eye, this seems the simplest and most obvious explanation applicable to those forms of constitutional hæmorrhage called active, as well, indeed, to those which result from obstacles to the circulation through an organ.

Hæmorrhage has been ascribed, also, to some alteration in the pores or apertures through which the healthy exhalations are transmitted from the capillary vessels. This change is considered to partake of the nature of morbid debility, or relaxation, and very different from that produced by the distension of plethora. That such a state of the capillaries may sometimes exist, is not unlikely, particularly in those constitutional hæmorrhages termed passive, where the effusion of blood takes place from several parts in succession, or at the same time; but as we are altogether ignorant of the natural condition of the exhalants, it is difficult to reason about the alterations to which they may be liable in disease. This hypothesis derives support from the occasional efficacy of astringent substances, which, when taken into the system, check the further effusion of blood, as they do other exhalations, namely, sweat and serum. (Watson, *Med. Gaz.* vol. x.)

Another mode in which the occurrence of hæmorrhage has been explained (Andral, *op. cit.* vol. i.), and which is principally applicable to the passive forms of the disease, is by a supposed alteration in the consistence or composition of the blood itself, which becomes attenuated, and capable of passing through channels or orifices that healthy blood cannot permeate. In defence of this supposition may be adduced the facts, that hæmorrhages are known to occur where the blood is obviously more thin, pale, and serous than natural; and still more remarkably, where that fluid has undergone further demonstrable changes in its chemical nature, or is even visibly altered in its sensible qualities, as, for example, in purpura hæmorrhagica, scorbutus, typhoid fevers, malignant small-pox, and erysipelas. These hypothetical attempts to explain the processes by which hæmorrhage may take place, deserve, as Dr. Watson has observed, more attention than has sometimes been paid to them. The views which they involve can scarcely be regarded as mere speculative refinements; for they often exercise a real, though perhaps an unacknowledged, influence upon our practice. At any rate, if they do not, prior to experience, justify certain modes of treatment, they accord wonderfully with what experience has taught concerning the means by which hæmorrhage may sometimes be stayed or prevented. In some cases we succeed by measures which tend to abate the general force of the heart and arteries, and to lessen general plethora, or by diverting partial plethora and restoring the disturbed balance of the circulation, or by directly emptying the turgid capillary vessels. In other cases we rely chiefly upon expedients which we believe to have the effect of constringing the extreme vessels: styptics to the bleeding part; cold to the surface of the body, producing a sympathetic shrinking in other related membranes; or internal medicines, which use has shown to have the property of restraining the natural exhalations when in excess. And, finally, there are cases where we seek, and not in vain, to repair the blood, to restore it to its natural condition by improvements in diet, or by food of a peculiar kind, such as the juice of lemons; and thus the tendency to hæmorrhage is cured. (*Cyc. Prac. Med.*)

It will here be desirable to consider rather more in detail the effects of hæmorrhages both local and general.

The local effects depend a good deal upon the organ whence the blood is effused; and also, whether that organ has any natural outlet to the surface of the body. The general effects on the constitution vary much according to the quantity of blood lost, and the rapidity of the effusion.

The local effects are always manifested in the disturbance of the functions

of the organ whence the blood escapes: if the trajet of the blood towards the exterior be short, and the communication of the bleeding organ with the surface be easy and uninterrupted, then the oppression of the suffering viscus is soon removed; and, after a shorter or longer time, its natural functions are restored, as is evident after attacks of epistaxis, hæmatemesis, or menorrhagia. If, on the contrary, the bleeding part do not communicate immediately or very freely with the exterior, then, after a hæmorrhage, a long train of after-symptoms follow, which are more or less serious according to the importance of the organ affected. Such phenomena we observe after bronchial, or renal, or intestinal hæmorrhage. If the surface whence the blood flows have no natural outlet, as the serous membranes, particularly the arachnoid, the pericardium, or the pleura, then the local effects of the hæmorrhage are very serious on account of the effused blood becoming a source of permanent pressure and irritation to the important organs invested by those membranes. These local effects of hæmorrhage are aggravated to a much more alarming extent, when the blood is effused into the minute parenchyma of an organ, or into the interstitial cellular tissue: the functions of the organ are not only interrupted, but its structure is generally permanently damaged. These various local consequences of internal hæmorrhages must be borne in mind, as they materially modify the prognosis in different cases.

With respect to the constitutional effects of spontaneous hæmorrhages, if the blood be poured out rapidly, and in large quantities, we witness similar phenomena to those which occur when a large quantity of blood escapes from some wounded vessel; but should there be a succession of hæmorrhages from the same or different parts of the body, and only a moderate quantity of blood be lost on each occasion, then we witness phenomena much more permanent.

The appearance of persons whose systems have been gradually drained of the vital fluid by repeated hæmorrhage is very striking, and often at once leads the experienced physician to detect the existence of a disease, of which the patient himself may have been unconscious. The skin of such persons is deadly pale, or has a clear waxen hue: it would seem as if the little remaining blood did not reach the surface of the body, or as if nothing but a serous fluid circulated through the skin; the conjunctival vessels appear bloodless; the lips and ears are blanched; the tongue, the lining of the lips and mouth have a pale yellowish tint; the hands and feet are cold and shrunk, while the head is hot, and there is an occasional pink flush on the cheeks; the respiration is hurried on the slightest bodily exertion. In more severe cases the skin is covered by a cold perspiration, and the legs are œdematous. Sooner or later, after repeated hæmorrhages, the heart recovers from its first state of debility, and the stage of reaction commences: evinced by palpitation of the heart, beating in the epigastrium and in the course of the aorta, and an increasing throbbing of the carotids, the temporal and other arteries of the cranium. The pulse is generally frequent, or easily excited by the least mental or bodily exertion, and it then communicates to the finger a peculiar thrill or vibration, which is apt to deceive and impart the sensations of power or hardness: firm, continued pressure with the finger, however, soon convinces that the artery does not expand with real power; it is activity without power. This apparent energy of circulation alternates with occasional syncope, particularly if the person suddenly assume or preserve for some time the erect posture, or make any continued muscular effort.

This activity of the circulation gives rise to many symptoms of disturbance of the nervous system. Thus the violent pulsation of the carotids is followed by distressing throbbing pain in the head, sometimes accompanied with intolerance of sounds and light, requiring complete abstraction from the influence of both; at other times the retina becomes almost insensible to light, the pupil remains dilated, and there is a transient state of amaurosis, the patient complaining of a sensation of tightness, as if the cranium were bound round by a cord. More alarming symptoms of disturbance of the cerebral functions oc-

casionally supervene; delirium and even confirmed mania may be the ultimate effect of the loss of blood. The functions of other organs, as the lungs and the alimentary canal, are also much embarrassed by the insufficient supply of blood; but it is in the nervous system and the circulation that we trace the most manifest constitutional effects of successive attacks of hæmorrhage.

Treatment of constitutional hæmorrhage. The general rules of treatment only can be laid down here, because very considerable modifications must necessarily be adopted, according to the organ whence the blood flows; to these the attention will be directed when hæmorrhages from particular parts are described.

We shall first advert to the treatment of those hæmorrhages which recur from time to time, generally from the same organ, and which from their periodical recurrence bear considerable analogy to natural menstruation. The seat of these hæmorrhages is most commonly the mucous membrane of the rectum or the nostrils, although they occur in other parts. It seems to be agreed by nearly all writers, that they are not to be interfered with by the *nimiâ medici diligentiâ,* unless under special circumstances: 1. if they become excessive, they must be restrained; 2. if they are deficient in quantity, they must be encouraged; 3. if they are entirely suppressed, they should be renewed; 4. if they change their seat, and some other organ pour forth the blood vicariously, it is generally better to endeavour if possible to induce a return of the hæmorrhage to its former situation.

1. Although these habitual or periodical hæmorrhages generally occur to the most robust, nevertheless they appear in persons of delicate constitutions, and thus the means to be resorted to for repressing the excessive flux of blood will be different, according as the constitutional symptoms are sthenic or asthenic. The means to be adopted will be more particularly described in the treatment of active and passive constitutional hæmorrhages.

2. To encourage a deficient discharge of blood, all those means must be adopted which tend to produce a local congestion of the bloodvessels, or to determine the circulation towards the part. These indications may be accomplished by position of the part; by the application of local stimulants, or irritation, in the neighbourhood of the part,—particularly by the various methods of increasing its temperature, by hot fomentations, by immersing the part of the body in a hot bath: the blood may be drawn to the vessels of the part by the application of hot mustard cataplasms on the adjoining surface, or by dry cupping in the neighbourhood. Should the foregoing attempts to restore a sufficient discharge of blood fail, then local depletion by cupping, or, better still, by the repeated application of a few leeches in the neighbourhood, will supply the place of the hæmorrhage, and to a limited extent will also cause a determination of blood in that direction. The practitioner must, however, remember that these constitutional hæmorrhages, whether periodical or not, continue throughout life, and generally decrease in quantity with advancing years. He must therefore be guided by this knowledge in his attempts to solicit the discharge of the accustomed quantity of blood.

3. When habitual hæmorrhage is altogether arrested, the suppression is almost invariably the effect or the cause of considerable constitutional disturbance. If the total cessation can be ascribed to some accidental circumstance, as sudden disease of a distant organ, then, when that disease is overcome, with the returning health we often observe a return of the former habitual hæmorrhage; but should it not be renewed, its continued suspension becomes the cause of serious disturbance of some other organ, more or less closely related to the part whence the blood habitually flowed. Thus the continued interruption of an habitual hæmorrhoidal flux is almost sure to be followed by great disturbance of the functions of the stomach or of the liver, and ultimately of organs not so intimately related, through the circulation to the rectum, as the brain or lungs. Again, if habitual epistaxis be suspended, it is generally replaced by some affection of the brain, the lungs, or the skin. Hence we see the importance of restoring such hæmorrhages when entirely suspended.

4. The habitual hæmorrhage may have ceased, and some other organ may have commenced pouring forth blood with great regularity. Under these circumstances it is almost invariably desirable to re-establish, if possible, the original hæmorrhage. This object must always be attempted when menstruation is suppressed, and some other organ as the stomach, the intestines, the rectum, bladder, or some part of the skin, pours forth a vicarious hæmorrhage. Some rare cases of deviation in the seat of the hæmorrhage however may occur, where the metastasis is unimportant or even favourable: thus, habitual epistaxis may be replaced by hæmorrhois, or this latter may occur after repeated attacks of hæmatemesis, and the change may even be regarded in a favourable point of view. Should any deviation of repeated attacks of bronchial hæmorrhage take place, the metastasis to the alimentary or urinary passages is to be considered a favourable event; but as a general rule, when a metastasis has taken place, we should employ all the means we possess of determining the flow of blood towards the original seat of the habitual hæmorrhage, and remove as far as possible those causes which may have tended to draw it towards the part last affected. That peculiar state of constitution, in which the body upon the receipt of very slight injuries is disposed to pour forth blood in unusual quantities, must be treated upon general therapeutical principles and with careful attention to the condition of the blood itself.

When describing the characters and general symptoms accompanying *active* hæmorrhages, we stated that they may be regarded as the natural remedy to the conditions which give rise to them, and that they generally cease after the discharge of a certain quantity of blood. If, therefore, the quantity effused be moderate, we should not be over solicitous to arrest the flow of blood, unless it be discharged from some organ, whose functions may afterwards be impaired by the presence of the effused blood. If a hæmorrhage have commenced with active symptoms, and be so excessive as to induce great exhaustion, the blood must then be arrested as speedily as possible.

To attain this object, cool fresh air must be allowed to circulate freely around the patient, and he must be kept in a state of quietude All muscular exertions, as well as mental emotions, all kinds of stimulating food and drink, in short, every thing which is known to have the power of exciting the heart's action, should be carefully avoided; and that posture of the body should be recommended, which is the least favourable to the afflux of the blood towards the part affected. Thus, the horizontal posture will be most desirable when the hæmorrhage is from the lower parts of the body; and the erect, when it comes from the upper parts.

Of the actual remedies to be employed for checking profuse active hæmorrhage, the most important and the most powerful is venesection. The effects attained through artificial bloodletting by venesection are, diminution of the force of the heart's contractions, abstraction of the general plethora, removal of local congestions, and diversion of the current of blood from the suffering organ. The method, the amount, and the repetition of the bloodletting, will be regulated by the circumstances of the case.

Other means of diminishing the vascular plethora, which so commonly attends active hæmorrhage, may be resorted to, as purgatives and diuretics. Indeed, the former class of remedies act most powerfully and beneficially as derivatives, both in the active and passive forms of the disease. Astringents are also a powerful class of remedies in hæmorrhage; but it is principally in the passive forms that they are most useful. Cold acts as an astringent, and is extremely useful in stanching the flow of blood. It may be brought into immediate contact with the bleeding surface, as when ice is swallowed to restrain hæmatemesis; or cold water injected into the rectum in hæmorrhois, or into the vagina in uterine hæmorrhage. The cold may be applied near to, but not immediately in contact with the bleeding surface; as to the skin of the nose and forehead in epistaxis, to different parts of the abdomen in hæmorrhage from the alimentary canal, to the perinæum or groins when blood escapes from the

uterus or bladder. The flow of blood is restrained by a sympathetic action on the bloodvessels of distant parts, as when epistaxis is suddenly stopped by the application of cold to the back or the genital organs, or the catamenia by wet feet.

When a profuse active hæmorrhage has been arrested by the above-mentioned remedies, it is the duty of the practitioner to recommend the adoption of such measures as may prevent a recurrence. The patient should carefully avoid those circumstances which induce general plethora, and not less so those causes which promote afflux of blood towards the part, whence the discharge has taken place. If the organ is likely to suffer from the presence of the effused blood, an attempt should be made to establish a permanent derivation of the circulation towards some other part from which hæmorrhage is not attended with serious consequences; and should the premonitory symptoms of hæmorrhage from that same organ again appear, it is better, with the hope of preventing such an accident, to draw off a quantity of blood by venesection.

In the treatment of *passive* hæmorrhages the object should be, first, to arrest them as soon as possible; secondly, to remove the state of constitution on which they depend. The aggravation of constitutional distress which ensues after each successive passive hæmorrhage, requires that the flow of blood be, if practicable, immediately arrested. Here venesection is inadmissible in the great majority of cases, although the skilful practitioner may occasionally resort to it to arrest internal passive hæmorrhage. When the situation of the parts permits of it, the different methods of compressing the bleeding surface may be attempted. The application of cold is often very efficacious. The best internal remedies to control passive hæmorrhage, are those substances which are called tonics and astringents. Some of these are vegetable, others mineral productions. The vegetable substances employed are chiefly those into the composition of which the gallic acid enters. Such are preparations from gall nuts, catechu, kino, oak-bark, and rhatany root; infusion of red roses, sulphate of quinine, and oil of turpentine, are also much used. The mineral substances, which are supposed to possess a styptic property when administered internally are the acetate of lead, the mineral acids, particularly the sulphuric, alum, sulphate of copper and zinc, nitrate of potash, and the tincture of the sesquichloride of iron. The choice of these numerous remedies will depend upon the judgment of the practitioner; some of them are more particularly applicable to hæmorrhages from certain parts, and these will be pointed out when the individual hæmorrhages are considered.

The second indication to be fulfilled in the treatment of passive constitutional hæmorrhages, is to improve the state of health on which they depend. For this purpose we must enjoin careful rules of diet; the patient should breathe a bracing air, enjoy constant exercise in the country, avoid all mental or bodily fatigue; and where we have reason to apprehend a deterioration of the blood, the cautious and long-continued use of preparations of iron will often be attended with the best effects.

Symptomatic and sympathetic hæmorrhages. In the preceding part of this article we have described the pathology and general plan of treatment of spontaneous hæmorrhages resulting from constitutional disturbance; we must now briefly advert to those other hæmorrhages, which we have termed symptomatic and sympathetic, depending upon serious changes of structure in different organs.

We have already directed attention to the pathological fact, that a sudden hæmorrhage sometimes appears to constitute a whole disease; it is the only morbid phenomenon that we can detect; such is the case when it occurs as a symptom of constitutional disturbance, as epistaxis or menorrhagia. At other times, a hæmorrhage forms the principal sign and earliest indication of local lesion of structure; it is then truly symptomatic. Lastly, hæmorrhage from a part is sometimes only an accidental symptom of obstructed circulation

through it, the obstacle being situated elsewhere; we have called this last form of hæmorrhage, sympathetic.

Symptomatic hæmorrhage. The local lesions of structure, which most frequently give rise to this form of hæmorrhage, are, 1. inflammatory congestions of parts; 2. the changes of structure induced by inflammation, as the induration, softening, and ulceration of tissues; 3. the development of new and morbid growths in organs, as tubercles, carcinoma, &c.

1. Hæmorrhage, as a consequence of inflammation of a tissue, is by no means uncommon; it happens both at the early and later stages of that process. The congestion of the bloodvessels of a part is the first visible phenomenon of inflammation; when this is established, blood will sometimes escape from the part in the form of hæmorrhage, and immediately the congestion and other local signs of inflammation disappear. At other times, the escape of blood from the vessels, instead of cutting short the inflammation, only causes increased embarrassment to the affected part. This happens when the effused blood remains pent up, and cannot make its way by any natural outlet from the body.

2. In the more advanced stages of inflammation, when softening or induration of the affected tissue has taken place, any sudden afflux of blood to such altered structure may be immediately followed by hæmorrhage. If the inflamed tissue have gone into a state of ulceration, the coats of some bloodvessel may be eroded; and this lesion gives rise to the most formidable and incurable attack of hæmorrhage.

3. Andral, Louis, and many other pathologists are of opinion, that copious hæmorrhage is one of the earliest symptoms indicating the development of morbid deposits in organs: thus, hæmoptysis is one of the earliest symptoms of the development of tubercles in the lungs; and when carcinoma attacks the stomach or the uterus, hæmorrhage from those organs is a very common and early symptom. The hæmorrhages to which the foregoing observations apply, may be strictly termed symptomatic; they depend upon lesions of structure in the parts whence they occur, and are independent of pathological conditions of other organs.

Sympathetic hæmorrhages. There are other hæmorrhages depending upon local lesions of structure, which we have thought right to distinguish by the title of sympathetic. In these the flow of blood takes place in consequence of some structural lesion in other organs than that from which the blood actually escapes. The part in which the hæmorrhage occurs, sympathises with some other part, the two having some intelligible connexion or relation to each other through the vessels of their circulation. Thus, valvular disease of the left side of the heart occasions obstruction to the pulmonary circulation, and hæmorrhage takes place into the lungs. Again, atrophy or induration of the liver obstructs the free circulation through the portal vein, and hæmorrhage from the mucous membrane of the intestine is the consequence. These are instances of what we term sympathetic hæmorrhage.

The numerous symptomatic and sympathetic hæmorrhages are not accompanied by any uniform train of symptoms, such as characterise active and passive constitutional hæmorrhages. They are rather preceded and accompanied by symptoms referrible to the organ, the structural lesion of which occasions the hæmorrhage. Thus, in a symptomatic hæmorrhage the escape of the blood is preceded and accompanied by symptoms strictly belonging to the organ whence the blood flows, as in hæmoptysis from tubercles in the lungs, in hæmatemesis from ulceration of the stomach, in hæmaturia from renal calculus. On the other hand, in sympathetic hæmorrhage the escape of blood is long preceded by symptoms of disordered function of that organ, which causes the embarrassment of the circulation, rather than of the organ whence the hæmorrhage takes place; as in hæmoptysis from diseased heart, in hæmatemesis from enlarged spleen, in intestinal hæmorrhage from diseased liver. Attention to

this part of the history of a case of hæmorrhage will materially assist the practitioner in making a correct diagnosis.

The treatment of these symptomatic and sympathetic hæmorrhages consists in the judicious application of remedies suited to the lesions of structure of the different organs which give rise to such hæmorrhages.

Hæmorrhages considered with reference to their seat. Hæmorrhages may be regarded, with reference either to the anatomical characters of the tissue whence the blood flows, as the mucous or serous membranes, for example, or to the organ whence that fluid escapes, as from the lungs, stomach, uterus, &c. The former arrangement appears the more philosophical, and has been preferred by able writers, as Chomel (*Dict. de Méd.* vol. ii.), and has been recently adopted by Dr. Copland (*Dict. of Med.*).

In our own opinion we shall better preserve brevity and afford a more comprehensive view of the subject by treating of hæmorrhages as they occur from the different tissues. At an early part of this article we stated the pathological fact, that there is scarcely a structure of the body which may not suffer from the spontaneous effusions of blood from its vessels. This accident occurs in the parenchyma of organs, in the cellular tissue, in the substance of the skin as well as from its free surface, from serous membranes, and especially from mucous membranes.

Hæmorrhage into the substance of organs. Blood is occasionally found infiltrated through the structure of an organ: its extravasation is more frequently the result of some disease of the tissue in which it is found, or it may occur from great disturbance of the circulation through the organ, however that may be produced. The same accident may be occasioned by great external violence over the seat of the organ.

Blood is not uncommonly found extravasated from such causes into the substance of the brain, lungs, liver, kidneys, testicles, and other viscera. These hæmorrhages are more appropriately considered with the special diseases of these several organs. They are most of them instances of the symptomatic and sympathetic forms of hæmorrhage.

Cutaneous hæmorrhage. Hæmorrhage from the vessels of the skin presents itself under two forms: in the first, there is an exudation of blood from the free surface of the cuticle; in the other, the blood is extravasated into the substance of the skin itself. The former of these cutaneous hæmorrhages is of very rare occurrence; when it does happen, the escape of blood is generally confined to a limited portion of the surface, though sometimes the exudation is much more extensive. Whenever blood is thus poured forth from the free surface of the skin, the appearance of this remarkable phenomenon may generally be traced to some cause operating on the constitution generally, and not to any structural lesion of the skin itself. When the cutaneous hæmorrhage is local, it takes place most commonly from the face, the front of the chest, the mamma, the armpit, the navel, the groin, the hand, or the foot. All these parts have occasionally been known to be the seat of this kind of hæmorrhage.

These circumscribed transudations of blood from the skin have occurred at all ages, and in both sexes, but far more frequently in the female. We have met with two cases of this description in females, but have known of one only in men. These rare forms of hæmorrhage are met with chiefly in chlorotic girls, and they are generally of that character which have been termed vicarious, the bleeding taking the place of some other habitual hæmorrhage.

The first case of this kind which came under the writer's treatment, was in the person of a girl about eighteen, of fair skin and sandy hair, labouring under aggravated symptoms of chlorosis, with œdema of the lower extremities, and suppressed menstruation. In this girl, an oozing of watery blood took place around the nail of one of the great toes; it appeared several times, continued for a week or ten days, but did not assume the regularity of menstruation.

The other case occurred in a middle-aged plethoric woman, who was troubled with a nearly constant oozing of a dark red fluid from the nipple of one breast,

so that her shift was constantly stained by it. On pressure around the nipple, several drops of this dark bloody fluid could be obtained; it resembled a dark menstrual secretion more than real blood. The catamenia were not suppressed, but more scanty than might have been expected from so robust a woman.

Dr. Watson has accurately described the phenomena which are usually observed in these cases. The surface of the skin becomes covered, in the part affected, by a dew of blood; if this be wiped away, no unnatural appearance of the skin is perceptible, but the blood presently exudes afresh. Although no alteration of texture can be seen, sometimes the colour of the skin of the part undergoes some modification. In a case related by Dr. Whytt, the hæmorrhage took place from the extremity of the middle finger of the left hand, and was preceded and accompanied by a spot of redness, and by slight pain. Analogous phenomena were observed in the case of a Lombardy peasant, who had occasionally considerable hæmorrhage from the extremity of one thumb. The facts of this case were communicated to the writer when a student at the University of Pavia, by Bartolomeo Panizza, the Professor of Anatomy.

It has already been stated, that these various bleedings, from a limited portion of the surface of the body, are generally vicarious of some other habitual hæmorrhage; they are usually of short duration, and cease when the habitual discharge of blood is re-established. In some cases, however, the cutaneous hæmorrhage is obstinate, and even assumes the regular periodicity of menstruation, of which it is vicarious. Examples of periodical cutaneous hæmorrhage are also recorded to have taken place in men. Dr. Watson quotes a case from Mayer, where hæmorrhage from the skin of the arm recurred every spring time; this exudation of blood was then capable of being induced by the mere contraction of the muscles of the part. Cutaneous hæmorrhage is sometimes more extensive, and assumes the appearance of a general bloody perspiration. Such cases have been observed to occur under the influence of some powerful mental emotion, or excessive bodily exertion. Many authors have doubted the existence of such cases; but history, both sacred and profane, has put on record instances of this rare and singular phenomenon.

Charles the Ninth, King of France, is recorded to have exhibited this phenomenon during the last moments of his life. The blood is described as having oozed out all over his skin. Dr. Copland has detailed a remarkable instance of exudation of blood from the skin of a horse. An Arabian horse upon most occasions of exertion was covered with a bloody sweat, which became nearly pure blood upon great exertion. It was general, and unattended by any other sign of disease. (*Dict. of Med.*)

When the exudation of blood from the surface of the body is limited in extent, there is little danger, as it is generally vicarious of some suppressed natural discharge; the treatment consequently consists in endeavouring to restore that discharge. Those cases of bloody perspiration which have been attended to, are of too rare occurrence to make their treatment a subject of especial consideration. Such a phenomenon occurring in the human being would always be regarded with alarm, and as indicative of some powerful impression on the nervous system.

The second form of cutaneous hæmorrhage is that where the blood is not poured out on the free surface of the skin, but exudes into its substance, or between the cutis and cuticle, or into the subcutaneous cellular tissue.

When the blood is found extravasated in either of the two former situations, it is generally in small circular spots, varying in size from a pin's head to a split pea. These spots are generally very numerous; sometimes they are confined to a particular part of the body, as the abdomen or extremities; at other times they may be observed thickly sprinkled all over the trunk and limbs. When very minute, they are usually described as petechiæ, and are frequently found in the course of continued fevers of a peculiar type. When they are larger and numerous, they constitute the principal symptom of that remarkable disease called Purpura. When the blood is extravasated sponta-

neously into the subcutaneous cellular tissue, it is generally in considerable quantities; in such cases there is usually a similar effusion into the substance of the skin itself. The portions of skin where this hæmorrhage occurs, have a livid colour, and these livid patches or blotches are often found at many points in the same case. This variety of cutaneous hæmorrhage is met with in scorbutus and severe cases of purpura.

These various forms of hæmorrhage from the cutaneous vessels seldom proceed to any extent, without the co-existence of hæmorrhage from other tissues. Not only do exhalations of blood take place from the different mucous membranes during life, but when such cases terminate fatally, we find ecchymosis or purpurous spots in the mucous membranes of the mouth, fauces, stomach, and intestines; in the serous membranes of the lungs, heart, brain, and abdominal organs; in the substance of the muscles; in the neurilema of the large nerves; in the periosteum of the long bones; and sometimes in the parenchyma of the large organs.

Willan, Bateman, Rayer, and others, who have published systematic treatises on diseases of the skin, have described many of these varieties of cutaneous hæmorrhage as diseases of the skin itself. The preceding pathological facts prove that this is too limited a view of the nature of such affections, and that the cutaneous hæmorrhage is only one out of many indications of a serious constitutional affection.

Dr. Watson has taken this view of the nature of those cases which are characterised by extravasations of blood beneath the cuticle and into the substance of the skin. He has also given an interesting account of the various hypotheses which have been offered to explain these simultaneous hæmorrhages in the same individual. (*Med. Gaz.* vol. x. p. 498.) Some have ascribed them to an increased action of the heart and arteries, overcoming the natural resistance of the extreme vessels in their healthy state, an opinion which is quite untenable, 1st, because these hæmorrhages from the cutaneous vessels more frequently co-exist with an opposite state of the circulation, with a feeble action and diminished force in the heart and arteries; and, 2dly, because in cases where the impetus of the circulation reaches it highest pitch, as in certain inflammations, these purpurous spots on so many different tissues do not appear.

Again, the hæmorrhage has been attributed to a want of tone, to an unnatural degree of passive dilatation of the extreme vessels themselves, so that they allow a passage to the red blood, which, so long as they are in a healthy condition, they refuse to admit. Against this hypothesis we have the negative presumption, that supposing the channels of the hæmorrhage to be those outlets which we call exhalants, no evidence is furnished of their extraordinary patency by any excessive escape of their proper fluids, which might be expected if this hypothesis were true.

Another supposition is, that the coats of the minute vessels themselves somehow or other lose their consistence, become tender and fragile, and unable to sustain the ordinary impetus of the healthy blood. This notion carries with it at first sight a greater degree of probability than the last, for it is concordant with the well-known fact, that in many cases of purpura slight pressure upon the skin is soon followed by the appearance of a bruise, or by actual ecchymosis, a consequence it might seem of the breaking down of the fine vascular texture of the part upon which the pressure was made. But of all the solutions that have been offered with the view of accounting for the escape of the blood from its containing vessels in purpura, that appears to be the most simple, and the most probable, which ascribes it to some morbid alteration in the blood itself. This supposition is not inconsistent with any of the observed phenomena of the disease, and it seems the only one which is capable of explaining them all; and (what is strongly confirmatory of its truth) the blood in many, perhaps in all instances of the disease, in which it can be examined, is found actually to have undergone a change, and not merely a change which

may be ascertained by nice or elaborate chemical research, but such an alteration of its sensible qualities as is evident to the eye, and forces itself upon our notice.

There are some persons who think that with this change in the composition of the blood, there is combined a diminution of resistance in the coats of the minute bloodvessels; that these two circumstances often co-exist; and that the one has been the cause of the other. It is highly probable that such a pathological condition of the blood and its capillary vessels may co-exist in these cases; but which is cause, and which is effect, it appears at present impossible to decide.

However we may attempt to explain the process by which the blood escapes from the cutaneous vessels, it is certain that in all those cases which are characterised by extensive sanguineous effusions, as in scorbutus, purpura, malignant small-pox, and petechial fevers, the entire mass of the blood undergoes sensible alterations.

These cases of hæmorrhage into the substance of the skin and into the subcutaneous cellular tissue are to be regarded as examples of passive constitutional hæmorrhage, and to be treated upon those general principles which have been already explained.

Hæmorrhage from serous membranes. Exhalations of blood from serous membranes are of rare occurrence when compared with their frequency from mucous membranes. When blood is found extravasated into the sac of a serous membrane, it is very seldom that it can be ascribed to constitutional causes; it almost invariably has been occasioned by some diseased state of the membrane itself, such as active inflammation, or by the laceration of a bloodvessel from external violence, or the bursting of an aneurism. The only instances of hæmorrhage from the vessels of serous membranes, which can be ascribed to constitutional causes, are those passive exhalations into the subserous cellular tissue, which are observed in aggravated cases of scorbutus and purpura.

When hæmorrhage into any of the serous cavities takes place in consequence of the rupture of an aneurism or the laceration of a bloodvessel from external violence, if the individual do not sink rapidly, a train of symptoms arise analogous to those which are always observed upon the loss of any considerable quantity of blood. Syncope may or may not occur according to the amount of blood effused. Symptoms of compression of the organ or organs, which are invested by the serous membrane, are next manifested. Lastly, the effused blood, like any other foreign substance, becomes a source of irritation to the serous membrane, and the symptoms of inflammation of that membrane are developed. The subsequent course of the case will depend upon the seat of the extravasation, its amount, and the degree of inflammation that may supervene.

The blood which has been effused into serous membranes sometimes undergoes remarkable modifications. These are better observed in hæmorrhages into the peritoneum or pleura, than bloody effusions into the pericardium or arachnoid, because the organs, invested by the former membranes, can to a certain extent tolerate the pressure occasioned by the extravasated blood; while the functions of the heart and brain are sooner or later annihilated by such compression. If the blood has escaped from an aneurismal sac, or from the wound of some large vessel, the hæmorrhage is generally so great that the person quickly sinks, and the effused blood is found merely separated into crassamentum and serum, there not having been time for any further change to take place. But if the quantity extravasated be more moderate, and the person have survived the hæmorrhage for some days or weeks, the effused blood will be found coagulated. This acts as a foreign body, and excites a certain degree of inflammation around it, which usually terminates in the effusion of coagulable lymph. If the inflammation be confined to this stage, the

mass of coagulated blood is found enveloped by a false membrane, enclosed as it were in a pouch. These false membranes are developed with great rapidity around masses of extravasated blood, both when it is effused into serous cavities and into the substance of organs, and appear to be formed for important purposes. They circumscribe for example the coagulum, and limit the extent of its irritation: they confine it to one situation, and thus prevent it from subsequently becoming a source of irritation to other parts; they likewise probably present a surface admirably calculated to act by absorption upon the foreign body. This latter function of the new membrane is particarly manifested after cerebral hæmorrhage. A cyst is formed around the clot, which after a certain time is entirely absorbed. The same train of phenomena is occasionally observed after hæmorrhage into a cavity lined by a serous membrane.

When the extravasated blood excites inflammation of the serous membrane, it may not be limited to the surrounding parts and to the exudation of coagulable lymph, but proceed to more extensive lesions under which the person ultimately sinks.

If the quantity of blood effused be small, and it be not gradually absorbed, it may become organised, increase in bulk, and at length converted into a new structure. This physiological fact was first made known by John Hunter, then corroborated by Abernethy, and has subsequently been confirmed by the observations of Andral, Carswell, and the author. (*Med. Gaz.* vol. xvi.; *Croon. Lect.* 1835.) In Mr. Abernethy's "Attempt to form a Classification of Tumours according to their Anatomical Structure," he states that John Hunter, upon opening the cavity of the abdomen, once discovered lying upon the peritoneum a small portion of red blood recently coagulated. This, upon examination, was found connected to the surface upon which it had been deposited by an attachment half an inch long; and this neck had been formed before the coagulum had lost its red colour. "Now," says Mr. Hunter, "had vessels shot through this slender neck, and organised the clot of blood, as this would then have become a living part, it might have grown to an indefinite magnitude, and its nature and progress would probably have depended on the organisation which it had assumed." "I have in my possession," writes Mr. Abernethy, "a tumour, doubtless formed in the manner Mr. Hunter has described, which hung pendulous from the front of the peritoneum, and in which the organisation and consequent actions have been so far completed, that the body of the tumour has become a lump of fat, whilst the neck is merely of a fibrous and vascular texture."

Thus, then, blood effused into serous cavities may excite inflammation, or it may be gradually absorbed in the manner described, or it may become organised and transformed into a new structure.

Hæmorrhage from the serous membrane of the brain or spinal cord. The effusion of blood from these membranes is almost invariably occasioned by the laceration of vessels from external violence, or disease of the vessels themselves. Under either circumstances, the symptoms of pressure on the nervous centres are immediately manifested, and a more or less extended paralysis is the consequence. This paralysis may gradually disappear, and complete recovery take place, or the usual symptoms of irritation of the membranes of the brain and spinal cord may supervene; or death may ensue; and then the various changes in and around the effused blood, which have been described, are discovered upon dissection. The symptoms and pathology of this lesion will be found detailed under DISEASES OF THE BRAIN AND SPINAL CORD.

Hæmorrhage from the pleura. This may occur from the bursting of an aneurismal tumour into the pleural cavity; from the erosion of a large bloodvessel by ulceration; from the laceration by external violence of some of the large vessels within the chest, or laceration of the parenchyma of the lung. More rarely the extravasation of blood may be the consequence of active inflammation of the pleura itself.

When hæmorrhage into the pleura arises from the rupture of a bloodvessel, however it may have been occasioned, if the effusion of a large quantity of

blood is not followed by fatal syncope, the symptoms of compression of the lung are quickly manifested by an increasing and distressing dyspnœa. This is soon succeeded by more unequivocal signs of inflammation of the pleura, which sooner or later leads to a fatal termination. After death, besides the usual appearances found in pleurisy, the changes in and around the effused blood already described are discovered. When hæmorrhage takes place into the pleura, in consequence of active inflammation of this membrane, it constitutes what has been termed *hæmorrhagic pleurisy.* This affection is generally fatal. On dissection the blood is found intimately mixed with the serous effusion; more rarely it is found partly fluid, and partly coagulated.

Andral has recorded two very interesting cases of this latter description. In both instances the pleurisy came on very gradually and lasted many weeks before the fatal termination. Each case was characterised by complete remission of the severer symptoms, and by fatal relapses. Upon dissection a considerable quantity of pure blood, partly liquid and partly coagulated, was found covering the inflamed pleura. No peculiar symptom accompanied these attacks, which could have indicated the nature of the effusion. (*Clin. Méd.*, vol. ii. obs. 15 and 16.) It is probable that, in these and similar cases, the blood is effused only a short time prior to the fatal termination, and perhaps in the following manner: — Upon the fresh accessions of inflammation, the newly organised and highly vascular false membranes, which are formed at the earlier part of the attack, become intensely congested. The newly formed vessels are ruptured by the sudden distension of their coats, and pure blood escapes into the cavity of the pleura. This explanation is rendered probable by the ascertained fact, that the inner layers only of the false membrane are stained by the blood, while those immediately in contact with the pleura retain their usual consistence and colour.

Hæmorrhage into the pericardium. When blood is found extravasated into the pericardium, its source may generally be traced to the rupture of an aneurism of the aorta: the hæmorrhage may also proceed from one of the cavities of the heart, in consequence of the penetration of its walls by some sharp pointed instrument.

Dr. Baillie in his *Morbid Anatomy* says, "Cases have occurred, though very rarely, in which a large quantity of blood has been accumulated in the cavity of the pericardium, but where no rupture could be discovered after the most diligent search, either in the heart itself, or in any of its vessels. This appears very wonderful, and not at all what any person would expect *à priori.* Two conjectures have occurred to me, to explain this phenomenon: first, that the bloodvessels on the surface of the heart have lost their compactness of tissue, so that the blood may have escaped by transudation. The other is, that the blood may have been poured out by the extremities of the small vessels, from their orifices having been to a very uncommon degree relaxed." Dr. Baillie refers to two cases of extravasation of blood into the cavity of the pericardium, in which the source of the blood could not, after the most careful examination, be discovered; and Dr. Carson has also detailed the particulars of a remarkably interesting case of this description. (*Med. Chir. Rev.* 1834.)

We have also met with a case of this kind in a man who was brought into St. Bartholomew's Hospital, faint and exhausted, and who quickly expired. A large quantity of blood was found in the pericardium, but a very careful scrutiny did not detect whence the blood had escaped.

It is probable that in such cases the blood escapes by a sort of passive exhalation from the surfaces of the pericardium; but it must be admitted, that the pathology of these rare cases is not well understood. The symptoms during life are those occasioned by loss of blood, combined with great precordial distress, and the physical signs of fluid in the pericardium.

Hæmorrhage into the pericardium occasionally arises from intense inflammation of that membrane. Dr. Latham once found upon dissection the cavity

of the pericardium filled with pure and unmixed blood, and its surface entirely lined with coagulable lymph, of which that portion which covered the heart itself was as red as the gills of a fish, and from its numerous lineal elevations not unlike them in other respects. The hæmorrhage, for such it really was, was considered to be owing to a secondary inflammation of the adventitious membrane. He offers the following explanation of the appearance of the blood in the sac of the pericardium, and which has already been suggested in describing hæmorrhage into the pleura: When the fluid effused into the pericardium (after inflammation) has a tinge of blood, it denotes an inflammatory action still continued in, or imparted afresh to, the newly formed and newly organised coagulable lymph. Newly formed and newly organised structures are very apt to pour forth blood upon any considerable excitement; and under these circumstances are found loaded with bloodvessels. (*Med. Gaz.* vol. iii.)

But hæmorrhage into the pericardium, the consequence of severe inflammation of that membrane, is more particularly likely to occur in a scorbutic constitution. Dr. Seidlitz, the senior physician of the Naval Hospital at St. Petersburg, published a memoir on a peculiar kind of pericarditis, attended with copious exudation of blood into the sac. (*Brit. and For. Med. Rev.* vol. i. p. 289.)

In 1831 several sailors died suddenly at St. Petersburg, whilst engaged at work; others who were admitted into the hospital lived only for a short period. On the examination of their bodies it appeared that their death was owing to a severe inflammation of the pericardium joined to a copious exudation of a sanguineous fluid into the pericardial sac. On Dr. Seidlitz communicating these facts, and exhibiting some of the diseased hearts to his colleagues, Dr. Crichton remarked, that the disease had been one of frequent occurrence amongst the troops. In February, 1832, the disorder appeared to have assumed an epidemic character. It is remarkable that the complaint was only to be met with between the months of February and September; the period during which scorbutic forms of disease commonly prevail at St. Petersburg; and it was usually associated with a transitory epidemic of a rheumatic nature. It is therefore probable that this singular malady was in reality rheumatic pericarditis occurring in scorbutic constitutions. All these cases exhibited during life well marked symptoms of pericarditis terminating in effusion of fluid, but no peculiar symptom indicated the nature of the effusion. Some of these cases were complicated with pleurisy, which had also terminated in sanguineous effusion: the cause of the escape of the blood in these cases was probably not that which has been suggested in explaining the extravasation of blood in common pericarditis and pleurisy; but it here arose from the scorbutic diathesis.

Hæmorrhage into the peritoneal cavity. The extravasation of blood into the sac of the peritoneum is rarely met with excepting upon the rupture of some large vessel in the abdomen. This accident may happen from the bursting of an aneurismal sac; from the laceration of some vessel by external violence; from the laceration of some viscus, as the liver, spleen, kidney, or intestines, by a blow or fall or other mechanical injury, or from the rupture of the ovary or Fallopian tube in extra-uterine pregnancy. The symptoms occasioned by such extravasation, and the effects which ensue, are precisely similar to those described when treating of hæmorrhage into the pleura. The abdominal organs are more tolerant of the presence of the effused blood than the thoracic, and death does not so constantly result from this accident. Blood is also found extravasated into the peritoneum in some cases of peritonitis, particularly in that form of the disease which comes on after a repetition of the operation of paracentesis. The observations which were offered in explanation of the escape of blood in pleuritis are equally applicable to cases of peritonitis accompanied by extravasation of blood.

Hæmorrhages from mucous membranes. We have already entered very fully into the pathology of hæmorrhages from mucous membranes. It is unnecessary, therefore, to dilate upon this subject. The mucous membranes afford

the most frequent and remarkable examples of constitutional hæmorrhages, both active and passive as well as vicarious. Symptomatic and sympathetic hæmorrhages likewise occur from these membranes. And as the respiratory, alimentary, urinary, and genital organs, are traversed by canals lined with mucous membranes, so do the hæmorrhages from these surfaces constitute an important series, which we shall proceed to describe as so many separate diseases.

HÆMORRHAGE FROM THE NOSE, OR EPISTAXIS.

Symptomatic of constitutional and local disease. — Active. — Passive. — Vicarious. — Treatment.

Epistaxis (derived from ἐπὶ, *super*, and στάζω, *stillo*), signifies a flowing of blood from one or both nostrils. Bleeding from the nostrils is so conspicuous a phenomenon, that it can rarely take place without exciting observation. The blood may, however, escape from the posterior aperture of the nostrils into the pharynx, and be thence rejected through the mouth, and is then liable to be mistaken for hæmoptysis. At other times the blood received into the pharynx is unconsciously swallowed, occasionally exciting nausea and vomiting, and simulating hæmatemesis, with the suspicion of disease of some of the chylopoietic viscera.

When blood flows from the external opening of the nostrils, we can generally ascertain that the seat of the hæmorrhage is the Schneiderian membrane. Epistaxis is certainly one of the most frequent and most harmless of hæmorrhages, occurring at all ages, from early childhood up to advanced old age: it happens to the most robust as well as the most delicate, and is most frequently a symptom of a particular state of constitution; hence all that has been advanced in discussing constitutional hæmorrhages, both as to the mode of escape of the blood, their pathology and treatment, applies in the great majority of cases of epistaxis. There may however exist particular lesions of the Schneiderian membrane and parts adjacent, which give rise to epistaxis. Like every other hæmorrhage which is entitled to be regarded as a symptom of constitutional disturbance, so do we find epistaxis associated with very opposite conditions of the system. Sometimes it must be regarded as an active, at other times as a passive, hæmorrhage; and all that has been stated, when describing these forms of hæmorrhage, applies to epistaxis.

Epistaxis, as an active hæmorrhage, is observed in robust and plethoric habits, most commonly in the interval between puberty and old age: it is met with more frequently in men than women. The quantity of blood lost upon these occasions varies from a few drops to several pints: in the earlier periods of life the loss of blood is generally attended with great relief to the constitutional and local symptoms; but when this discharge is continued through the advanced periods of life, although the present relief may be as great as at earlier periods, still there is more reason to apprehend danger from the continued tendency to cerebral congestion.

In those who are constitutionally predisposed to active hæmorrhages, many causes tend to bring on epistaxis; thus, slight injuries about the nose; violent exercise; sudden increase of temperature of the atmosphere; powerful emotions of mind; continued study; stimulating food; irritation of the sensitive nerves of the nostrils by snuff, ammonia, or other volatile stimulants, which may cause sneezing; fits of coughing; depending position of the head; wearing a tight cravat, or waistband, &c. But epistaxis often happens when we cannot trace it to the operation of any of these exciting causes: the individual is made aware of its approach by various premonitory symptoms: sometimes

a sense of fulness, heat, tingling or itching, within the nostrils, or weight over the brow; pain in the forehead; headach; heat of head; giddiness; noise in the ears, or some morbid state of vision, are felt. The flow of blood appears and continues for a certain time, with considerable relief to the local symptoms. The hæmorrhage at last ceases, but is easily renewed if the person does not adopt precautions to keep the circulation quiet for some time afterwards.

Epistaxis is likewise met with as a passive hæmorrhage: in this form it occurs most frequently in delicate children and young persons about the age of puberty, and sometimes to a most alarming extent: it also happens in persons of all ages, labouring under cachexia: it is an occasional symptom in fevers, particularly in those forms accompanied with typhoid phenomena, and in those diseases where it is known that the blood is greatly deteriorated, as in scorbutus and purpura. When epistaxis occurs as a passive hæmorrhage, it is not usually preceded by any marked premonitory symptoms; the blood suddenly pours forth from the nostrils, in large quantities, without any assignable exciting cause; and in young children, of delicate constitutions, in the upper classes of society, it may induce dangerous and almost fatal syncope before the hæmorrhage can be arrested. When it occurs in the cachectic the flow of blood is seldom so rapid, but the oozing often continues for a longer time, sometimes for several days in succession. In either case we may remark an aggravation of constitutional depression, and an increased tendency to a repetition of this unfavourable symptom. The quantity of blood lost by this form of epistaxis is generally considerable, often to the extent of many pounds; and cases are recorded, where the amount lost is hardly credible.

Epistaxis sometimes appears as a vicarious hæmorrhage, as, for example, upon the suppression of the catamenia or hæmorrhoidal flux, and continues as long as either of them is suspended. Indeed, epistaxis is not often met with in the female, after the period of puberty, unless the menstrual discharge is scanty, or accidentally suppressed.

Epistaxis, like other hæmorrhages, may be the consequence of a morbid condition of the bleeding part; thus, the Schneiderian membrane may be preternaturally delicate, vascular, and sensitive, so that very slight injuries, as the insertion of the finger into the nostril, blowing the nose, or sneezing, may rupture that membrane, and induce a considerable flow of blood. Inflammation of this membrane in common catarrh, or in that which accompanies some of the eruptive fevers, may give rise to epistaxis; or the presence of polypi in the nostrils, or disease of some of the bones of the nose, may excite undue vascularity of these parts, and give rise to epistaxis.

Treatment. When bleeding from the nostrils occurs with those symptoms which indicate it to be a constitutional hæmorrhage of either the active or passive form, it must be treated on the principles which have already been pointed out, when constitutional hæmorrhages were fully considered.

In those cases, where it is thought advisable to restrain the flow of blood, an erect posture, the application of cold about the head, nose, and neck, with pressure on the bleeding surface, will be found the most effectual means of controlling the hæmorrhage. Pressure may be accomplished in two ways. Direct compression may be made by passing a long piece of catgut, or other convenient flexible director, from the anterior aperture of the nostrils, whence the hæmorrhage issues, so far into the pharynx, that, by the aid of a pair of forceps, its extremity may be drawn into the mouth. To this director, a piece of cotton or lint is to be attached, of sufficient thickness to press against the walls of the nostril, when it is retracted from the pharynx: this being done, the director is to be separated from the lint or cotton, which is allowed to remain in the nostril, until further means shall have had the effect of suppressing the hæmorrhagic tendency. Such is the method generally recommended by surgical writers; but the irritation excited, when an attempt is made to put it

in practice, and, when effected, the aversion expressed by patients to its endurance, are so great, that whatever the danger may be, they will rarely submit to it, or suffer its continuance for a sufficient length of time; and it must be acknowledged, that there is some hazard that its removal may prove a fresh cause of excitement. (*Cyc. of Prac. Med.* art. EPISTAXIS.) A great surgical authority (Mr. Abernethy) used to tell his pupils with his accustomed humour, that he knew that such a method could be adopted, for he had seen it done; but that whenever he had tried to do it, he always failed, finding an obstacle in the excessive irritation produced in the muscles of the pharynx: but the same eminent surgeon has observed, that he had never seen an instance of epistaxis, which could not be suppressed (and he had seen a great many instances) by the introduction of a cylindrical plug of lint through the anterior nares, made sufficiently large to fill the tubular part of the nostril, being first wetted and wound round a probe, so as to give it the form of a bougie, long enough to allow it to be passed along the floor of the nose, from the anterior to the posterior aperture, but not into the throat, the probe being withdrawn when the lint has been thus disposed of. This plug should be allowed to remain in three or four days, while the proper means are taken to remove the causes of the hæmorrhage.

When this method of compression is very unpleasant to the patient, or when it cannot be effectually accomplished, some cooling and astringent fluid may be injected into the nostrils; either vinegar and water, the diluted solution of the acetate of lead, a weak solution of alum, sulphate of zinc or copper. Sometimes a very finely levigated astringent powder blown into the nostrils through a quill, or other small tube, will cause the blood to coagulate, and thus arrest the hæmorrhage. Powdered alum, powder of galls, and similar substances have been employed for this purpose; but unfortunately their presence sometimes excites sneezing and considerable irritation of the Schneiderian membrane, thus displacing the coagulum, and the hæmorrhage is renewed.

An instance of the successful use of the powder of gum acacia blown into the nostril in a case of epistaxis, which had continued for two days, and had resisted the other means generally adopted, has been reported in the *Medical Repository*, vol. xxvii. extracted from *Hufeland's Journal*. As this substance is not only free from the objection we have mentioned to astringent powders, but congenial to the sensibility of the Schneiderian membrane, and probably produces its good effect simply by increasing the tenacity and the adhesive quality of the blood on its issue from the bleeding surface, it may in some cases be an eligible application. The arrest of the hæmorrhage may often be accelerated by resorting to the use of those remedies which act by revulsion; thus, hot stimulating pediluvia, mustard cataplasms to the calves of the legs or soles of the feet, or a powerful stimulating purgative, as a large dose of oil of turpentine, will be found useful. Purgatives, indeed, are most efficacious in controlling epistaxis, whether of the active or passive forms.

The principles which are to guide the practitioner in his attempts to prevent the return of constitutional hæmorrhages from the nostrils, have already been explained. In those cases of passive epistaxis occurring in delicate children and young persons of precocious intellect, great advantage will be derived from shaving the head, or keeping the hair cut close; from a residence at the seaside, and bathing in the open sea; from cold shower baths, and cold bathing of the head and neck every morning; from gentle exercise in an open carriage, and from those various remedies which conduce to strengthen the constitution. When epistaxis is vicarious of menstruation, or of the hæmorrhoidal flux, it is desirable to resort to those methods of restoring the natural or habitual discharges, which have already been recommended.

When this form of hæmorrhage frequently recurs, in consequence of the delicacy of the Schneiderian membrane, it is advisable to protect it by anointing it daily with some simple ointment. If this membrane, or its subjacent bones be inflamed, the application of leeches externally about the nose, or at

the entrance of the nostrils, will often prevent a recurrence of epistaxis. If a polypus, or other cause of irritation, exist within either nostril, exciting congestion and nasal hæmorrhage, it should be removed by surgical operation without delay.

HÆMORRHAGE FROM THE LUNGS, OR HÆMOPTYSIS.

Definition. — General description. — Sources from which the blood may issue. — Pulmonary lesions induced by hæmoptysis. — Pulmonary apoplexy. — Causes of hæmoptysis. — Active constitutional hæmoptysis — its symptoms and treatment. — Passive constitutional hæmoptysis and its treatment. — Vicarious hæmoptysis and its treatment. — Hæmoptysis induced by pulmonary diseases, symptoms and treatment — by cardiac diseases, symptoms and treatment. — Hæmoptysis resulting from obstruction in the abdominal circulation.

THIS word, derived from αἷμα, blood, and πτύσις, spitting, strictly signifies the rejection of blood from the mouth, without reference to the source whence it may be derived, whether it pass upwards through the trachea and larynx, or through the œsophagus and pharynx, or be simply poured forth from the membrane of the mouth itself; but in the present day, pathologists are in the habit of employing it, in a restricted sense, to signify the expectoration of blood from the lungs and air-tubes.

It is then necessary to bear in mind, in every case where blood is rejected from the mouth, that its source may be either from the mucous membrane of the mouth itself, from the pharynx, from the stomach, from the larynx, trachea, and bronchial tubes, or from the vesicular structure of the lungs; but that under the term *Hæmoptysis* are comprised hæmorrhages from the respiratory organs only.

The respiratory organs are peculiarly predisposed to hæmorrhage, which will not appear surprising, when it is recollected how extensive a surface the mucous membrane of the bronchial tubes offers for exhalation, and how abundantly the lungs are supplied with blood; so that any cause which obstructs the free passage of the blood through the minuter branches of the pulmonary vessels, readily produces extreme congestion of the lungs, exhalation of blood, and ultimately hæmoptysis. Although the extravasation of blood, in any quantity within the bronchi or vesicles of the lungs, is almost sure to be succeeded by hæmoptysis, still this symptom is by no means constantly present, when smaller quantities are extravasated into the minuter structure of the lungs; as in that form of pulmonary hæmorrhage, called *pulmonary apoplexy.*

It would thus appear that hæmoptysis is an insufficient term to designate every form of hæmorrhage from the respiratory tubes; but as it is consecrated by long usage, it has been thought better here to point out this objection to its universal application to hæmorrhages from the air-tubes, rather than introduce any new word of doubtful acceptation.

Although no period of life can be regarded as exempt from hæmorrhage from the respiratory organs, still it is certain that hæmoptysis occurs most frequently in the interval between the ages of fifteen and thirty-five—the period when tubercular phthisis manifests itself, and active congestion of the lungs giving rise to exhalations of blood may be expected. But the aged and the infant are by no means exempt from pulmonary hæmorrhage. When it occurs in the former, it is most commonly connected with disease of the heart; and M. Billard has pointed out the existence of pulmonary apoplexy in infants only a few days old. We have also, upon two or three occasions, detected the existence of this form of pulmonary hæmorrhage in the bodies of infants at the Hôpital des Enfans trouvés at Paris. It is also probable that pulmonary

hæmorrhage may occur much oftener in children than pathologists suppose, as children invariably swallow the expectorated secretions.

It has been stated that the blood in hæmoptysis may arise from other sources than the respiratory organs. It is not uncommon to meet with individuals who, having observed streaks or spots of blood intermixed with their saliva, imagine that they have been attacked by hæmoptysis. It is generally easy to discover whether or not the blood comes from the mouth itself, by an attentive examination of the different parts of that cavity; besides, the blood is generally scanty in quantity, of a scarlet colour, quite fluid, and unmixed with air, which may generally be observed in that which comes from the respiratory tubes. The escape of blood from the posterior opening of the nostrils into the pharynx, and afterwards into the mouth, may be distinguished from that which passes upwards from the lungs. When the hæmorrhage is abundant, blood is sure to escape also from the anterior opening of the nostrils, and thus there is little doubt as to its origin; when the quantity is small, and flows backwards only, after resting some time on the velum palati, it is rejected from the mouth dark, coagulated, and unmixed with air; besides, shortly before or after this kind of spitting of blood, the mucus which comes from the nostrils will be observed to be tinged. The blood, which is rejected by hæmoptysis, varies much in quantity in its physical characters, and in the length of time it may continue to flow.

The quantity of blood lost by hæmoptysis is sometimes so great, amounting in some instances to several pints, that it is surprising a fatal result is not immediately produced; nevertheless, cases occur where similar quantities are lost several times, and it is not until long afterwards that incurable disorganisation of the lungs manifests itself; and indeed, in some rare cases, the individual after the cessation of the hæmoptysis continues in the enjoyment of good health. (Andral, *Clin. Méd.*, vol. ii. p. 179.) At other times the quantity is less considerable; the person expectorates a mouthful every now and then, after which the hæmorrhage entirely disappears: it is, however, to be regarded with alarm, as an index of deep-seated and incurable mischief in the lungs. Lastly, the expectorated mucus may be merely tinged, or streaks of blood may be seen mixed with it; in either case, serious lesions of the heart or lungs may be suspected. From the foregoing observations it is clear, that the quantity of blood lost by hæmoptysis is no index of the extent of thoracic disease, nor of the degree of danger in any particular case. It is desirable that the physical characters of expectorated blood should be known, as this knowledge sometimes assists the practitioner in forming a diagnosis, whence the blood has been poured forth. If the quantity be very large, it is generally of a bright scarlet colour, mostly fluid, although some coagula are generally observed mixed with it, and the upper surface of the ejected blood received into a basin appears frothy. When the blood is brought up in smaller quantities, as a mouthful at a time, it is generally of a bright colour, partly fluid and partly coagulated, but mixed with few or no bubbles of air: when the quantity of pure blood is still less, and is expectorated by coughing, it is generally coagulated, rather dark, and moulded into the form of the bronchial tubes. When the hæmoptysis consists in the expectoration of mucus more or less intimately imbued with blood, it is generally of a very florid red, minute air bubbles are disseminated through it, and the secretion is viscid. In such cases we may predict that the blood is exhaled from the minuter ramifications of the bronchi, or from the air vesicles themselves. The appearances of the expectorated blood will however vary, depending a good deal upon the length of time it has remained in the bronchi before it has been expectorated, and still more upon the time which has elapsed from the actual hæmoptysis, and the period when the blood is presented for inspection. It is evident, therefore, that much caution is requisite in judging upon the physical characters of the blood, although in some cases they may render great assistance in forming the diagnosis of the source of the hæmorrhage.

The duration of an attack of hæmoptysis is also liable to considerable va-

riation: some individuals are suddenly seized with a profuse discharge of blood, which gradually subsides and entirely disappears in the course of twelve or twenty-four hours. Others expectorate a smaller quantity of blood every morning for several days successively; the hæmoptysis subsides and recurs in a similar manner after some weeks or months. Where the quantity expectorated daily is small, or where the hæmoptysis consists in the expectoration of blood intimately blended with mucus, the attack may last for one or two weeks, then cease, and again recur in a similar manner. The cessation may be the result of the treatment adopted, and the recurrence may be traced to some imprudence on the part of the patient; but the greater number of individuals who are attacked with hæmoptysis, have a recurrence of it. It is very rare that in a first attack, however alarming, the hæmorrhage proves fatal; when death follows such an accident, it may be, as in the case of any other hæmorrhage, from exhaustion by syncope, or the quantity of blood poured forth may so obstruct the bronchial tubes as to produce asphyxia.

The sources from which the blood may issue in hæmoptysis (according to the definition of the term we have given), appear to be the three following:— 1. The larynx and trachea; 2. The bronchial tubes; 3. The vesicular structure of the lungs.

Hæmoptysis, arising from laryngeal or tracheal hæmorrhage, is of very rare occurrence; when it does happen, the blood may escape by exhalation from the lining membrane as in other parts, or from the mucous membrane, in consequence of ulceration exposing some subjacent vessel, or from the rupture of an aneurismal sac into the larynx or trachea. Chomel, one of the most able writers on hæmorrhage, has stated that laryngeal and tracheal hæmoptysis have been admitted rather from analogy, than established by any precise observations. "It has been thought," he adds, "that in those cases where patients have rejected a few frothy bloody sputa, preceded by tickling and heat in the larynx or trachea, and without dyspnœa, or other distressing sensations within the chest, it was rational to suppose the hæmorrhage took place from these parts of the respiratory organs; and it has been also thought, that if after such an hæmoptysis no symptoms of phthisis have supervened, this circumstance tended to confirm the opinion that the blood was not exhaled from the bronchial tubes. We can only admit this variety with doubt and reservation." (*Dict. de Méd.* art. HÆMOPTYSIS.) If a scanty exhalation of blood do sometimes take place from the larynx and trachea, it will be in those persons whose professions require a violent and prolonged exercise of the vocal organs; such as singers, actors, and public speakers. That hæmoptysis may sometimes, however, take place in consequence of ulceration in these parts, there is no doubt; an interesting example has been published by Dr. Watson. (*Med. Gaz.* vol. iii. p. 156.)

Hæmoptysis may also arise from the rupture of an aneurismal sac into the larynx or trachea; in such cases, previous to the occurrence of the hæmoptysis, unequivocal signs of this lesion, and all the distressing symptoms of continued pressure on the larynx or trachea, are observed. It appears needless to advert further to this source of hæmoptysis, because the hæmorrhage is so sudden and copious, that death almost immediately follows.

The bronchial tubes are by far the most frequent source of hæmoptysis, and the mode in which the blood escapes is by exhalation. Formerly, when it was generally believed that hæmoptysis only arose from a ruptured blood-vessel in the lungs, cases of recovery from hæmoptysis must have excited great surprise; but repeated observations have recently shown, that in many individuals who have died from profuse hæmoptysis, there is no physical lesion in the lungs beyond the presence of tubercles in different stages of development. The mucous membrane in these cases presents no other appearances than are observed in simple bronchitis; indeed, sometimes the bronchial membrane is found pale or only slightly stained. Andral has recorded a case of fatal hæmoptysis, where the parenchyma of the lungs was

perfectly healthy, where no tubercles were present, and where a simple exhalation of blood from the bronchial mucous membrane appeared to be the sole cause of death.

When blood is thus poured out into the bronchial tubes, it gives rise to many distressing symptoms:—Aggravated dyspnœa, a sense of a fluid bubbling or gurgling in the chest, which excites cough, and thus accomplishes the expulsion of the blood from the bronchi. When the blood is poured forth rapidly and abundantly into the bronchial tubes, it necessarily causes great obstruction to respiration. The person suffers great distress and a sense of impending suffocation; all the auxiliary muscles of expiration are called into action; they contract spasmodically; the lungs are forcibly compressed in every direction; and the blood is expelled from the bronchi into the trachea, larynx, pharynx, and mouth, whence, as well as from the nostrils, it escapes in jets. The irritation of the blood in the pharynx excites nausea and vomiting; so that upon examination the rejected blood is found mixed with the contents of the stomach, and thus often arises some difficulty in forming a diagnosis between hæmoptysis and hæmatemesis: this difficulty, however, is considerably lessened by the physical signs of disorganisation of the lungs being readily detected by auscultation. Other distinguishing signs will be enumerated when the subject of hæmatemesis is considered.

When blood is exhaled into the bronchi in smaller quantity, it often excites but little irritation, and escapes readily through the larynx into the mouth, hardly producing cough. When, however, the extravasated blood is more or less intimately blended with mucus, it generally produces more irritation, and is often expectorated by coughing with considerable effort.

When the extravasation of blood takes place from the smaller bronchial tubes, it sometimes happens that the blood stagnates and coagulates in them; and the consequence is, that some of the lobules of the lungs have a dark brown or black colour. Andral states his belief, that this is the most common origin of that peculiar lesion of the lungs, which has been designated pulmonary apoplexy by Laennec. In such cases there are found at various parts of the lungs several hard dark masses, more or less exactly circumscribed. They are found almost exclusively, he thinks, in individuals who have died during hæmoptysis; nevertheless, he has found similar lesions in the lungs of those who have never had hæmoptysis. He is far from regarding the situations of these apoplectic effusions as the only parts whence the hæmorrhage has taken place: they are but accidental lesions, which depend upon the stagnation and coagulation of the effused blood in some of the smaller bronchial tubes, the hæmorrhage which gives rise to the hæmoptysis taking its origin from a much more extended surface of the mucous membrane. (*Anat. Path.* vol. iii. p. 488.) This view of the mode in which these collections of blood are formed in some few lobules of the lungs, is very similar to that adopted by Dr. Watson, who thinks it probable that the seat of the effusion is (sometimes at least) in the larger branches of the air-tubes, and that the blood is forced into certain of the pulmonary lobules by the convulsive efforts to respire; and that they thus become so completely crammed with blood, as to preclude any subsequent admission of air, and to present the appearances of pulmonary apoplexy. (*Med. Gaz.* vol. ix. p. 656.)

The observations of Andral, and the interesting case of hæmorrhage from an ulcerated lingual artery, recorded by Dr. Watson, prove that, when blood is effused into the bronchial tubes, it may gravitate and coagulate in the vesicular structure, giving rise to those hard dark masses which are commonly described as pulmonary apoplexy. But the writer has, for many years, directed his attention to this pathological condition of the lungs; and although his field of observation has been extensive, still he has never been able to meet with a case of pulmonary apoplexy, where he could satisfy himself that this particular lesion was produced in the manner described by Dr. Watson. In the numerous cases of pulmonary apoplexy which have fallen under his observation, the

blood has appeared to have been extravasated where it is found coagulated; and so far from the majority of such individuals having died from hæmoptysis, as remarked by Andral, many have not had that symptom at all, or only in a very slight degree.

Another but rare form of bronchial hæmorrhage arises from the ulceration of the mucous membrane and perforation of the coats of some subjacent pulmonary bloodvessel. Dr. Carswell has recorded and delineated a case of this kind, where scrofulous ulceration made its way through a large bronchus, and perforated a contiguous branch of the pulmonary artery. Through this direct communication the blood escaped so abundantly, that the case proved fatal in less than a quarter of an hour. The sac of an aneurism of the thoracic aorta will sometimes compress and cause the absorption of the walls of a bronchial tube; at length the blood bursts into the bronchus, and the profuse hæmoptysis proves rapidly fatal.

The source of the hæmorrhage in hæmoptysis may be the vesicular structure of the lungs. A sanguineous exhalation into the pulmonary parenchyma is much more frequent than is generally supposed; and, no doubt, many persons die with this lesion of the lungs without its having been suspected, because it is not always accompanied by hæmoptysis. This kind of pulmonary hæmorrhage has not been so long known to pathologists as the former: it was first accurately described by Laennec, under the name of Pulmonary Apoplexy. The extravasated blood is found coagulated, blocking up the vesicular structure of a certain number of lobules of the lungs: these masses are hard, dark, and generally circumscribed: their section presents a dark granular surface, almost like a piece of damson cheese: upon scraping the surface the blood is removed, and the parenchyma of the lung becomes very visible: sometimes the surrounding tissue is unaffected; at other times fluid blood is found in the adjoining smaller ramifications of the bronchi. Sometimes the extravasated blood is not confined to the smaller bronchi and the air-cells of certain lobules; but these latter are ruptured; the blood then escapes into the interlobular cellular tissue; the parenchyma of the lung is broken down by the extravasated blood, which collects in clots in a cavity hollowed out of the substance of the lung. This, says Andral, is a true pulmonary apoplexy, very different from the former, where the blood is merely extravasated and coagulated in the bronchi and air-cells: in this latter lesion the pulmonary tissue is actually lacerated by the effused blood, just as the medullary substance is in cerebral apoplexy." (*Op. cit.* vol. iii. p. 511.) The extravasation is sometimes so considerable, that the structure of one lobe or more of a lung may be almost obliterated and reduced to a sort of pulp, consisting of liquid and coagulated blood. The extravasated blood may not only lacerate the substance of the lung, but also the pleura, into the sac of which it escapes in considerable quantities. Andral has recorded an instance of this kind, where a phthisical patient was seized with aggravated dyspnœa, bloody sputa, with the physical signs of pleurisy of the left side. After death the lower lobe of the left lung was found lacerated by the extravasation of blood, which had made its way into the pleura, and excited pleurisy. (*Clin. Méd.* vol. ii. p. 167.) When the pulmonary apoplexy is of small extent, it is not followed by immediate death: the individual may survive days and weeks. M. Bouillaud has recorded a case where a mass of pulmonary apoplexy was surrounded by a well organised cyst, of which the internal surface was probably destined to accomplish the absorption of the extravasated blood. (*Arch. de Méd.* Nov. 1826.) It would seem that, in this case, the same series of processes was about to be performed around this mass of extravasated blood, as pathologists have so often observed taking place after cerebral apoplexy.

Causes. The causes of hæmorrhage from the respiratory organs are sometimes general and constitutional; in other cases purely local and physical. Constitutional hæmoptysis is in some instances of an active, in others of a passive nature; or it may be merely vicarious of other natural or habitual

hæmorrhages. Hæmoptysis from local causes sometimes arises from physical lesions of the substance of the lungs themselves, or is connected with diseases of other important organs, especially of the heart, and occasionally of the larger abdominal viscera.

Hæmoptysis, appearing as an active constitutional hæmorrhage, independent of any discoverable alteration of texture, either in the mucous membrane of the bronchial tubes, or in any other part capable of influencing the capillary circulation of that membrane, is certainly of very rare occurrence. Those who have paid most attention to this subject have met with but few instances of it. It would seem that, whenever the constitution is in a state favourable to hæmorrhage, an effort is made to get rid of the superabundant circulating fluid through some other medium, as the nostrils, the stomach, intestines, or uterus. Although the presence of effused blood in the bronchial tubes is productive of alarming symptoms, and is so often followed by fatal results, nevertheless in those cases of vicarious menstruation through the lungs, the effused blood is expectorated again and again without permanent injury of their parenchyma. Chomel states, that a good many persons are to be met with who have had one or two attacks of hæmoptysis in the course of their lives, but who have notwithstanding reached an advanced age. (*Dict. de Méd.* art. HÆMOPTYSIS.) Andral also admits the occasional occurrence of constitutional hæmoptysis, and states that, in some individuals, it is not accompanied by more serious symptoms than a simple epistaxis. (*Clin. Méd.* vol. ii. p. 178.) Though the existence of hæmoptysis as an active constitutional hæmorrhage is established by recorded cases, we are still disposed to think that, in the greater number of supposed instances of spontaneous constitutional hæmoptysis, there exists a latent physical lesion, which will sooner or later manifest itself by more certain symptoms.

When this form of hæmoptysis does occur, the constitution of the individuals corresponds with the description given of those predisposed to active hæmorrhages, while the general symptoms do not materially differ from those observed in similar hæmorrhages from other parts. Those local symptoms which have been enumerated as preceding active hæmorrhages, will be observed in reference to the lungs. A sensation of dyspnœa, constriction across the chest, more or less pain, or sense of heat beneath the sternum, or irritation in the trachea or bronchial tubes, generally precede the expectoration of florid blood. The presence of the extravasated blood in the bronchial tubes produces an aggravation of dyspnœa, exciting frequent cough, a sense of gurgling or ebullition being, at the same time, felt in the chest, resulting from the passage of the inspired and expired air through the fluid blood in the bronchi. Auscultation generally detects the existence of that peculiar sound, technically called large crepitation, in various parts of the chest. These local symptoms continue until all the extravasated blood is expectorated.

When hæmoptysis occurs as an active hæmorrhage, the further exhalation of blood is arrested, both by the effect of actual loss of blood on the heart's action, and also by the shock to the nervous system, from the alarm of the patient upon viewing the gush of blood from the mouth, the hæmoptysis thus relieving the peculiar state of constitution on which it depends.

Treatment. As we have endeavoured to show that hæmoptysis is to be regarded as a symptom of different pathological condition of the whole system, or of particular parts, it is evident that it requires great modifications in its treatment. On this account it will be preferable to point out the treatment applicable to each form of hæmoptysis after describing its history. Although every active hæmorrhage may, to a certain extent, be regarded as a salutary effort of nature, and as tending to promote its own cure, still the extravasation of blood into the bronchial tubes is accompanied with such urgent symptoms, that the practitioner, upon its first appearance, is naturally most anxious to arrest further hæmorrhage. The plan of treatment, already recommended for active hæmorrhages in general, may be adopted in cases of hæmoptysis of an

active character. After the hæmorrhage is arrested, too much caution cannot be adopted in exercising the organs of respiration; and it may be necessary to repress the tendency to plethora by repeated bloodlettings. For a considerable period after the cessation of the hæmorrhage, the greatest care is necessary on the part of the patient.

Passive constitutional hæmoptysis is of more rare occurrence than the active form, and is only met with as a symptom in purpura, scorbutus, and perhaps some petechial fevers. The treatment principally consists in that adapted to the disease of which the hæmoptysis is an accidental symptom. It is in this kind of passive hæmorrhage that bloodletting is sometimes desirable, ss the loss of blood by venesection is a much less serious evil than its exhalation into the parenchyma of the lungs; neither is it inconsistent with sound pathology to administer tonics and nutritious diet at the same time that we employ moderate depletion; for, while we attempt to improve the supposed deteriorated quality of the blood, we also diminish the quantity of the circulating fluid, and thus repress the tendency to its escape from the vessels.

Hæmoptysis not unfrequently appears as a vicarious secretion, supplying the place of some suppressed periodical or habitual discharge. Thus in females, particularly among the lower classes, in whom disordered uterine functions are often long neglected, upon the suppression of the catamenia from cold or other cause, an occasional, and sometimes a periodical, hæmoptysis is observed. Perhaps, after the physical lesions of the lungs and heart, this is the most common cause of hæmoptysis. In some cases of vicarious hæmoptysis, we find it anticipating the usual menstrual period, and ceasing when the natural flux is established. In other cases the hæmoptysis altogether supersedes the catamenia for a great length of time, and establishing itself into a function almost necessary to the health of the individual. More commonly, however, the periodical hæmoptysis is supplemental of deficient or arrested menstruation. In these cases the individual suffers all the usual symptoms of constitutional disturbance preceding natural menstruation, when, after a few days, instead of the catamenia, pulmonary hæmorrhage makes its appearance, by which a degree of uneasiness in the chest is relieved. This state of things may continue for several years with much less detriment to the lungs and to the general health than might be anticipated The treatment of this form of hæmoptysis consists in the employment of those means which will strengthen the general health, and solicit the return of the menstrual discharge. They consist principally in the occasional application of a few leeches about the vulva or anus; the employment of pediluvia; the hip-bath, and the internal administration of emmenagogues. When hæmoptysis occurs as supplemental of an habitual hæmorrhoidal discharge, its consequences are much more prejudicial, than hæmoptysis vicarious of menstruation. Laennec supposed that the former was more likely to be productive of pulmonary apoplexy, while the latter was generally a simple bronchial hæmorrhage. This form of hæmoptysis is certainly a rare disorder, for out of 20,000 patients which have come under our observation, during the last four years, we have only met with one instance of it. This individual had long suffered from hæmorrhoids, and upon their suppression, he was attacked with hæmoptysis, which entirely disappeared on the return of the habitual discharge. In such cases the tendency to further hæmoptysis should be repressed by those means, which have been recommended in the treatment of active constitutional hæmorrhages, and then every effort made to encourage a return of the hæmorrhoidal discharge. Occasional local depletion about the anus should be adopted, to supply the want of the accustomed discharge.

Hæmoptysis arising from local and physical causes may be symptomatic, or the result of pathological conditions of the lungs themselves, and which may be comprised under the two following heads: — 1. The existence of tubercles in the lungs; 2. Inflammation of the bronchial tubes, or the parenchyma of the lungs.

Unquestionably the physical lesion with which hæmoptysis is most frequently associated, is the development of tubercles in the lungs. This fact is admitted by the best pathologists of the present day; but they are not all agreed in regarding the tubercles as the cause of the hæmoptysis; on the contrary, some have supposed, that in certain cases the hæmorrhage from the lungs has been the cause of the appearance of the tubercles. Andral has been cited as supporting this view of the question; but it seems to us, that this author's opinion has been misunderstood. Although he relates a case, where it appeared to him that the tubercles were altogether dependent on the extravasation of blood, still he informs us, that of persons who die of phthisis, one half do not expectorate blood until the tubercles have given unequivocal proofs of their existence; and that another sixth never spit blood at all, throughout the whole course of the disease, while in one third only does the hæmoptysis precede and appear to be the starting point of the development of the tubercles. (*Clin. Med.* vol. ii. p. 181.) Andral thus establishes, by the results of his own clinical observations, the very opposite opinion to that assigned to him by Dr. Law. (*Cyc. Pract. Méd.* art. HÆMOPTYSIS.) Laennec is of opinion, that the formation of tubercles precedes the hæmoptysis; and though this may be the first symptom of disease which alarms the patient, and induces him to seek medical assistance, yet if the chest be examined before its appearance, the physical signs of the existence of tubercles in the lungs will be detected.

Andral considers that these affections are so constantly associated together, that of all those persons who at some period of their lives have had hæmoptysis, only one fifth are exempt from the development of tubercles in the lungs. The opinion of Louis on this point is still more strong. He states, that for the space of three years he inquired of every patient who came before him, whether they had ever suffered from hæmoptysis, and he found that none but phthisical patients replied in the affirmative, excepting a few who had suffered from violence to the thoracic organs, or women labouring under amenorrhœa. He therefore thinks, that at whatever period hæmoptysis may occur (with the exception of the above mentioned cases), it renders the existence of tubercles in the lungs highly probable. In only one fifth of the cases of Louis, the hæmoptysis preceded the cough and expectoration, so that the exhalation of the blood is rather to be regarded as the result than the cause of the tubercular infiltration. (*Sur la Phthisie*, p. 193. 204.) We may, perhaps, ascribe the frequency of hæmoptysis, in the early stage of phthisis, to the obstruction of the pulmonary circulation, caused by the extensive development of tubercles in the parenchyma of the lungs. This obstruction may give rise to the hæmorrhage in two ways; it may either compel an increased energy of the right ventricle, whereby the blood is thrown with undue force into the pulmonary vessels, and thus induce hæmorrhage, or, the tubercles obliterating a considerable portion of the pulmonary parenchyma, there is no longer a just proportion between the quantity of blood circulating through the lungs and the capillaries of those organs, and thus a relative plethora is induced, and escape of blood in the bronchial tubes is the consequence. This accident is much more likely to occur, when the development of tubercles has been very rapid, and there has not been time for the heart to undergo that atrophy, so common in phthisis, nor for the quantity of the blood to have been reduced to the altered state of the system.

The next source of the blood in hæmoptysis is tubercular ulceration of the lungs. Those who are familiar with the disorganising process in the lungs which ensues when tubercles soften, would reasonably expect that erosion of large vessels, and consequent hæmoptysis, would occur. Again, those who, having opened the bodies of persons dying with hæmoptysis, have found the tubercular cavities, as well as the bronchi leading to them, full of blood, might anticipate that the blood had escaped from some eroded bloodvessel; but the careful investigations of Laennec, Andral, and others, into the pathology of

phthisis, have demonstrated the interesting fact, that the bloodvessels of the lungs generally escape the destructive process; that they become pressed against the walls of the vomica, and are gradually obliterated. Laennec states, that he never found a vessel of any consequence, included within the substance of these bands, traversing a vomica; and that Bayle had mentioned only one case in which fatal hæmoptysis ensued upon the rupture of a vessel that extended across a very large cavity. Andral states, that he never but once found the orifice of a ruptured vessel in fatal hæmoptysis, and that this vessel was contained in a band stretching across a cavity which had been ruptured. The orifice of the torn vessel was plugged up by a small pale coagulum, which was easily removed, and left the extremity of the vessel quite free and open. In every other instance of fatal hæmoptysis, Andral was unable to discover that the hæmorrhage was the consequence of a ruptured vessel. In the course of twelve years' nearly constant attendance in the medical wards of St. Bartholomew's Hospital, we have only once met with a case of hæmoptysis, where the open orifice of an ulcerated bloodvessel in a vomica was discovered in the lungs after death. Instead of pure blood in a vomica, there is often only some puriform fluid, more or less stained with blood. In both cases the effused blood is evidently in the great majority of cases the result of exhalation from the bronchi and the walls of the vomica, and not from a ruptured vessel. Since hæmoptysis is so frequently a symptom of the development of tubercles in the lungs, it is necessary that the diagnosis between it and that which we have called active constitutional hæmoptysis should, if possible, be established. In that form of constitutional hæmoptysis, which arises from general plethora, and that which attends upon the early stages of the development of tubercles, the local and general physiological phenomena are so similar, that the diagnosis between them cannot be established upon such data. But the physical signs, elicited by auscultation and percussion, will generally distinguish those cases which depend upon the presence of tubercles in the lungs. It has been stated by Louis, that phthisical hæmoptysis is seldom preceded by heat, pain in the chest, or other symptoms of fever more striking than those present for some days previously. (*Op. cit.* p. 204.) This assertion, however, is not corroborated by the observations of other inquirers; and ever since these remarks of Louis have come under our notice, we have inquired of many persons suffering from hæmoptysis, for the first, second, or third times, whether they have been sensible of any uneasy sensations previous to its appearance, and they have invariably replied in the affirmative. The only exceptions met with have been in robust men engaged in laborious occupations, who, it is well known, do not attend to those minor indications of approaching disease, which alarm persons in the higher classes of society. When hæmoptysis occurs at the more advanced stages of phthisis, the local and general physiological symptoms, as well as the physical signs of tubercles, which have existed for a longer or shorter time, render the diagnosis comparatively easy. The practitioner called to a case of hæmoptysis for the first time, might mistake the large crepitation from blood in the bronchi for that arising from softened tubercles.

The treatment of hæmoptysis, occurring as an early symptom of the development of tubercles, will not essentially differ from that recommended when it results from general plethora: we must employ general bleeding until an impression is made upon the activity of the circulation, and the pulmonary hæmorrhage is arrested. Laennec has very justly remarked, that bleeding in such cases will not prevent the development of tubercles, nor remove them when already formed in the lungs; the abstraction of blood, therefore, must be limited to the quantity sufficient to relieve the congestion of the vessels. Any loss of blood beyond this is a serious diminution of the patient's strength, and is more likely to accelerate the progress of phthisis. Abstraction of blood by venesection in these cases of hæmoptysis may generally be followed by local depletion near that portion of the lungs, which we suspect to be the seat of tubercles.

The local symptoms of distress about the chest will greatly subside after the application of a few leeches or the cupping glasses.

The circulation should then be kept as tranquil as possible by perfect rest of body and mind, the reclined posture, a cool temperature, and abstinence from all stimulating food or drink. To avoid the necessity of further abstraction of blood, such remedies as digitalis, tartarised antimony, nitre, and saline purgatives may be prescribed. When hæmoptysis depends upon the presence of tubercles it is very seldom, even with the utmost care, that a recurrence can be prevented. The return may be procrastinated by judicious treatment, but at length some accident causes congestion of the pulmonary circulation, and a second attack of hæmoptysis ensues. The case now generally resolves itself into one of phthisis, and the treatment must be conducted with reference to that disease, and not simply to the accidental symptom of hæmoptysis. The slighter forms of hæmoptysis, which occur at the more advanced stages of phthisis, seldom require bloodletting; we must endeavour to repress it by acetate of lead, mineral acids, opium, digitalis, nitre, and counter-irritation.

Hæmoptysis may be the result of inflammation of the mucous membrane of the bronchi or the vesicular structure of the lungs. When the hæmorrhage takes place at an early stage of the inflammation, it is sometimes considerable; but when it comes on at a more advanced stage, the quantity of blood effused is trifling, and generally mixed with the expectoration. The appearance of mucus, streaked or stained with blood, is an index of the severity of the inflammation, and this kind of rusty expectoration is almost pathognomonic of pneumonia. The treatment of hæmoptysis, resulting from these pathological states of the lungs, merges altogether into that which is necessary to control the inflammation. It is but an accidental symptom arising from the inflammatory congestion, and disappears when that is relieved.

The next form of hæmoptysis is of a most serious description, and is an instance of what has been termed sympathetic hæmorrhage, resulting from physical lesions in other important organs. It may be safely asserted, that next to the existence of tubercles in the lungs, the most frequent cause of pulmonary hæmorrhage and hæmoptysis is to be found in structural diseases of the heart. Chomel states that in these cases of hæmoptysis the disease is commonly situated in the right chambers of the heart. (*Dict. de Méd.* art. HÉMOPTYSIE.) This opinion is also maintained by Dr. Law. (*Cyc. Pract. Med.* art. HÆMOPTYSIS.) But we entirely coincide with Dr. Watson, who thinks these opinions "are not borne out either by reason or general experience." The alteration in the structure of the right cavities of the heart, which these authors have asserted to be the cause of pulmonary congestion, pulmonary apoplexy, and consequent hæmoptysis, is hypertrophy of the right ventricle,—a morbid condition which is comparatively rare on that side the heart, and which, we believe, would not suffice for the production of hæmoptysis, even if it did exist. At least the most striking cases of hypertrophy of the right ventricle we have met with, have been in cases of extensive emphysema, and where there never had been any hæmoptysis. The immediate effect of any obstruction to the free flow of the blood, through the right side of the heart, would be to gorge the liver and the branches of the vena porta, and to prevent the lungs receiving their due proportion; whereas any physical alteration of the left side of the heart may impede the return of blood from the lungs, cause accumulation there in the form of congestion of the capillaries, and so dispose to pulmonary hæmorrhage. Upon this point of pathology Dr. Watson has made some judicious remarks which are worthy of attentive consideration. (*Med. Gaz.* vol. ix. p. 156.)

Numerous cases corroborating the views of Dr. Watson may be found recorded in medical journals. Dr. J. A. Wilson was one of the first to point out the connection between the contraction of the mitral orifice and that pulmonary hæmorrhage which produces pulmonary apoplexy and hæmoptysis.

There is, however, another and less common morbid condition of the left side of the heart, which may be the cause of pulmonary hæmorrhage, and that pecu-

liar lesion termed apoplexy of the lungs; it is a dilated state of the left auriculo-ventricular opening. We have twice lately met with patients, who were suffering under hæmoptysis, with the physical signs of extensive pulmonary apoplexy and obstruction of the circulation through the left side of the heart, and in whom during life we had suspected the existence of extreme contraction of the mitral orifice, but, upon examination of the body after death, there was found extreme dilatation of that orifice; so that it was permanently patulous, and permitted the reflux of blood upon the lungs upon each contraction of an enlarged and hypertrophied left ventricle. We must therefore admit, that any lesion of the left side of the heart, which is capable of obstructing the circulation through it, may be the cause of pulmonary hæmorrhage.

The symptoms which accompany pulmonary hæmorrhage, depending upon disease of the heart, are of course combined of those which indicate disordered functions of both those important organs. There is most distressing dyspnœa, constant hacking cough, with expectoration of a more or less abundant tenacious mucus, deeply dyed or intimately blended with blood. It is seldom that the quantity of blood is so considerable as in phthisical hæmoptysis. Auscultation and percussion reveal the presence of fluid blood in the smaller bronchi of some portions of the lungs; while other portions seem to be rendered quite impervious to the air. At the same time there are unequivocal signs, both physical and physiological, of structural lesions of the left side of the heart, which usually have existed for a considerable length of time. It is obvious, that the treatment of this form of hæmoptysis can never be successfully pursued by the internal use of those remedies which are supposed to possess the specific property of arresting hæmorrhage. As long as the obstruction to the circulation through the left side of the heart is sufficiently great to produce remora of the blood in the lungs, so long will the pulmonary hæmorrhage continue. The treatment must therefore consist, in the first place, in relieving the oppressive congestion of the capillaries of the lungs, by local depletion, by the application of cupping glasses near to that spot where we suspect the pulmonary apoplexy is forming; secondly, a return of this condition of the lungs may be obviated, by diminishing the quantity of the blood by the occasional application of a few leeches over the region of the heart, and by the administration of saline purgatives and diuretics, particularly nitre, digitalis, bitartrate of potash. By such means, if the extravasation of blood into the lungs be not already considerable, the hæmoptysis may be arrested, and the individual rescued for a time from the destructive effects of the effused blood on the parenchyma of the lung.

The last form of hæmoptysis, to which we shall direct attention, is another instance of what has been termed sympathetic hæmorrhage, viz. that which arises from obstruction of the circulation through the abdominal aorta and its branches, in consequence of distension and pressure caused by enlargement of some of the abdominal viscera. In the advanced stage of pregnancy the great distension is sometimes attended with hæmoptysis. The same accident may happen from pressure on the abdominal vessels in ascites or tympanitis. In all such cases, if the disease on which the distension of the abdomen depends cannot be removed, the treatment must consist in diminishing the quantity of the circulating fluid and keeping the action of the heart as tranquil as possible.

HÆMORRHAGE FROM THE STOMACH,

OR HÆMATEMESIS.

Etymology. — Symptoms. — Diagnosis. —Prognosis. — Duration. — Influence of age and sex. — Quantity of blood effused. — Its physical characters. — Condition of the stomach in hæmatemesis. — Causes. —Active constitutional hæmatemesis. —Symptoms and treatment. — Passive hæmatemesis and its treatment. — Vicarious hæmatemesis and its treatment. — Hæmatemesis induced by organic lesions — of the stomach — of other organs.

HÆMATEMESIS (derived from αἷμα, blood, and ἐμέω, I vomit) literally signifies the vomiting of blood, and therefore has been very generally employed to designate hæmorrhage from the stomach. Dr. Watson, however, has remarked that vomiting of blood is by no means the invariable accompanying symptom of escape of blood into the stomach, and he therefore objects to the employment of this term hæmatemesis in its usual acceptation. Other modern writers have objected to the term on similar grounds, and have proposed to substitute for it the Greek compound, *gastrorrhagia.* But as equally strong arguments may be adduced against the acceptation of this term, especially that it conveys erroneous ideas of the pathology of gastric hæmorrhage, and no advantage being gained by the proposed substitution, we shall employ hæmatemesis to designate gastric hæmorrhage.

The symptoms which usually accompany gastric hæmorrhage may be thus described:—An individual, previously perhaps in apparent robust health, after some powerful mental emotion or bodily exertion, is suddenly seized with a sense of fulness of the stomach and sickness, when he speedily ejects by vomiting, much to his own surprise and alarm, a quantity of blood. Previous to the attack of hæmatemesis, various premonitory symptoms, indicating considerable functional disturbance of the digestive organs, are generally experienced; such as loss of appetite, indigestion, sense of fulness in the epigastrium, pains in the hypochondriac regions, and costive bowels, until at length the uneasiness at the epigastrium amounts to dull pain, accompanied by a sense of weight and distension, with distressing sickness; a general feeling of chilliness and coldness of the extremities, giddiness, dimness of sight, and faintness are felt, when at last blood in a fluid or partly coagulated state is vomited. These symptoms, which precede and accompany the hæmatemesis, probably arise from very different causes. At first there is a feeling of uneasiness, from congestion of the vessels of the stomach; then arise the sense of weight, distension, and nausea, occasioned by the presence of the effused blood in the stomach; and, lastly, the symptoms of syncope from the actual loss of blood supervene. It is not until a quantity of blood is effused, sufficient to excite nausea or produce distension, that an effort to vomit is made.

After the actual hæmatemesis has ceased, many of these symptoms also subside, and the person remains greatly exhausted, and much alarmed lest the hæmorrhage should return. It is in this state of collapse, with a pallid face and cold skin, that the patient is usually found on the arrival of the practitioner.

When symptoms such as have been described present themselves, the diagnosis of *hæmatemesis* appears to be clear, but in practice it is often difficult and obscure, and only to be arrived at through presumptive evidence. In the first place, hæmorrhage may take place from the mucous membrane of the stomach, and no hæmatemesis ensue. This may happen, either when the quantity of blood extravasated is very small or very large. When blood escapes from the gastric vessels very slowly and in small quantities, it passes the pylorus, and becomes visible only in the alvine evacuations, in which, however, it may not always be recognised, in consequence of the changes it has undergone in its passage through the alimentary canal. But if a small quantity of this altered

blood be detected in the stools, there is not only uncertainty from what part of the canal it has been effused, but there is little suspicion of its being effused from the stomach. On the other hand, the quantity of blood poured into the stomach may be very large, and the hæmorrhage very sudden; the individual sinks into fatal syncope, and no blood is vomited. A case of this description is alluded to by Dr. Watson. (*Med. Gaz.* vol. x. p. 438.)

Whenever blood is vomited, some degree of caution in deciding upon the source of the hæmorrhage should be exercised. There are cases of bleeding from the nostrils, the fauces, or even lungs, in which the blood, collecting in the pharynx, provokes, from time to time, an involuntary action of deglutition, and gradually accumulating in the stomach, is at length ejected by vomiting. This may occur in epistaxis coming on during sleep, especially in young children. The blood which is vomited is often in considerable quantity and coagulated, so that, from its appearance, it is scarcely possible to conclude that it has proceeded from any other source than the stomach itself.

Hæmatemesis is one of the few complaints which may be successfully feigned by impostors, either for the sake of avoiding military or naval service, or with the intention of exciting the compassion of the charitable. Blood has sometimes been swallowed in considerable quantities by such persons, and then vomited in the presence of those whom they wish to deceive.

Diagnosis. There is only one disease which is likely to be confounded with hæmatemesis, and that is a very profuse hæmoptysis. In copious hæmoptysis, the blood issues from the mouth in gushes, as it does in hæmatemesis; its regurgitation into the pharynx, the tickling sensation it produces there, or the violence of the cough which frequently excites retching—these causes, acting singly or together, produce sometimes a convulsive contraction of the muscles of the thorax, followed not unfrequently by vomiting. On the other hand, in sudden and profuse hæmatemesis, the irritation of the blood passing over the epiglottis is very likely to provoke a violent fit of coughing.

In these cases, which are perplexing when we first approach them, and particularly so if the patient be of the lower class, we may nevertheless arrive at a correct diagnosis by a careful investigation of the symptoms that precede, accompany, and follow the hæmorrhage. The premonitory symptoms of hæmatemesis, particularly in reference to the digestive organs, have already been described. This affection is also more frequently than hæmoptysis preceded by the symptoms of approaching syncope, because the quantity effused in gastric hæmorrhage is sometimes very considerable before the actual hæmatemesis, but not so in bronchial hæmorrhage. On the other hand, hæmoptysis is usually preceded by dyspnœa, cough, tickling in the throat, and a sensation of a bubbling fluid in the chest. Most commonly too, immediately before or after the hæmoptysis, there is expectoration of bloody sputa. Again, those who are conversant with the practice of auscultation and percussion, will find the physical signs of structural changes in the lungs, or of the presence of the effused blood within the bronchial tubes. The expulsion of blood in gastric hæmorrhage ceases shortly after the first full vomiting, and is succeeded by obscure pains in the abdomen; but in hæmoptysis the hæmorrhage continues in smaller quantities, and is followed by increased dyspnœa and cough.

It has been stated by Chomel (*Dict. de Méd.* vol. x.) and other writers, that hæmatemesis is a rare form of hæmorrhage; some have even asserted that hæmorrhage takes place less from the stomach than from any of the mucous surfaces. There is no doubt, however, that hæmaturia is much more rarely met with, and that hæmatemesis is, in this metropolis at least, by no means a rare disease.

Hæmatemesis, like other forms of hæmorrhage, is apt to recur; sometimes there is no recurrence, though more commonly it is reproduced by the same or other exciting causes. Though an alarming syncope may take place at the time of the hæmorrhage, death is very rarely the immediate consequence of hæmatemesis, even when the quantity of blood vomited is very large. Its frequent

recurrence will necessarily weaken and undermine the constitution, more especially when it is dependent upon structural disease of some important organ. Far more danger is to be apprehended from the cause than the extent of the hæmorrhage. Individuals who have suffered repeated attacks, are sometimes reduced to a complete state of anæmia; and the obvious characters of that pathological condition are often the symptoms which first excite suspicion that hæmorrhage is going on from the alimentary canal.

There is nothing definite in the duration of hæmatemesis; it is extremely difficult to ascertain the precise moment when the gastric hæmorrhage commences; and medical aid is rarely sought until the patient and attendants are alarmed by the vomiting of blood.

Like other formidable affections of the abdominal organs, gastric hæmorrhage occurs most frequently during the middle period of life, from the age of thirty to fifty; it very rarely occurs in old people, and Chomel thinks that it has never been observed in children.

It is commonly stated, that women are more frequently subject to hæmatemesis than men, and this accords with the writer's experience; and it is generally less formidable and more easily cured in females. In women it may generally be traced to suppressed menstruation, or to insufficient discharge in persons of full plethoric habits and of sedentary occupation. In men it is generally the result of structural change in an important organ, induced almost invariably by habits of life unfavourable to health, by too close application to business, by neglect of proper exercise, by indulgence in the pleasures of the table, and, among the lower orders, by excessive use of ardent spirits. In persons so predisposed, any causes which are capable of exciting congestion of the vessels of the stomach, may bring on an attack of hæmatemesis.

The quantity of blood effused in hæmatemesis varies from a few ounces to several pints. When only a small quantity is extravasated, after undergoing more or less completely the process of digestion in the stomach, it may pass onwards through the pylorus; and a portion of the blood, doubtless, pursues that course in most cases. But when it is vomited, it comes up in large quantities, usually in great part coagulated. Sometimes the coagula appear to have assumed the form of the stomach; in other cases the clots thrown up are partially deprived of their colouring particles, and resemble the fibrinous concretions so often found within the cavities of the heart after death. The degree of coagulation of the blood, of its separation into crassamentum and serum, as well as the changes in colour the coagula undergo, will generally be in proportion to the time it has remained in the stomach, this depending materially upon the rapidity of the effusion. The blood ejected by hæmatemesis is usually dark and partially coagulated, and more like venous than arterial. The colour does not, however, indicate whether the effusion has taken place from arteries or veins, but rather the length of time it has remained in the stomach. Dr. Carswell in his work on the elementary forms of disease (*Hæmorrhage and Melanosis*) has, more completely than any other author, explained the changes which take place in the effused blood, both in gastric and intestinal hæmorrhage. He states, that the blood effused into the stomach and intestines is seldom found to present its natural red colour, either when thrown out from these organs or when contained in them after death. It has often acquired a dark purple hue, and still more frequently a deep brown tint resembling bistre or the peculiar blackness of soot. The dark brown and sooty discolorations of the blood may always be regarded as the result of the action of an acid chemical agent, formed in the digestive organs, on the effused blood; except in those cases in which they are produced by the introduction of an acid poison, Hence he concludes, that the diseases called *black vomit* and *melæna* are mere modifications of gastric and intestinal hæmorrhage; the black colour being an accidental circumstance of no importance, and derived from the chemical action of the acid product on the blood, previous to its evacuation.

The mode of escape of the blood, from the vessels of the stomach in hæmate-

mesis, presents the same peculiarities which have been pointed out in hæmorrhages from other mucous membranes. The effusion of blood is very seldom occasioned by the rupture of a bloodvessel, as was formerly supposed ; but far more commonly by exhalation. It is true, that anatomy has not contributed much information on the pathology of hæmatemesis, because it is very seldom that such cases terminate fatally immediately ; but, in many cases, the evidence that the blood is exhaled from the mucous membrane is satisfactory and conclusive, because we are able to scrutinise minutely the whole extent of surface, which cannot be so thoroughly done in the bronchial tubes after hæmoptysis. When death has followed immediately after hæmatemesis, the mucous membrane of the stomach has, again and again, been found completely entire and of its natural consistence and texture ; sometimes partially red, vascular, and pulpy, or universally so, the submucous capillary network of vessels being still gorged with blood ; in other instances it is quite pale, the congestion of the capillaries having been completely relieved by the hæmorrhage. Sometimes, again, the gastric membrane is studded with minute dark spots, which can be made by slight pressure to start from the surface, as if it were sprinkled with soot or grains of very fine black sand. These latter appearances are corroborative of the opinion, that the blood passes through pores or channels, which do not, in the natural state, permit its escape. These sand-like bodies, Dr. Watson thinks, are small portions of blood which have coagulated in the exhalant orifices of the membrane, and received from them their shape. The sooty points, above alluded to, are no doubt small portions of blood acted on by the free acid in the stomach.

Causes. A point of as great importance as the diagnosis, and upon the solution of which depends the prognosis and treatment of the case, is the cause of the hæmatemesis.

The gastric hæmorrhage is sometimes referable to general constitutional disturbance ; in other cases it arises from some organic lesion.

When hæmatemesis arises from constitutional disturbance, it is sometimes attended with symptoms indicative of an active form of hæmorrhage ; at other times, it can only be regarded as a passive effusion, or, in other instances, as a vicarious discharge when some constitutional or habitual flux has been suppressed.

Hæmatemesis, independent of any apparent change of structure in the mucous membrane of the stomach, or in any organ capable of influencing the circulation through that membrane, is certainly rare, although the writer believes that he has met with several such cases. Dr. Watson has stated that he had never seen nor heard of any instances of hæmatemesis, analogous to the epistaxis which is so common in children and young persons, and which, he considers, affords the most familiar examples of idiopathic, or of what we have described as active constitutional, hæmorrhage.

Andral, in enumerating the various causes under the influence of which hæmorrhage may take place from the lining of the alimentary canal, after pointing out the effects of mechanical obstruction to the circulation through the portal vein and those arising from some evident process of irritation of the membrane, adverts to simple congestion of the bloodvessels of the membrane:—" The blood accumulates in the vessels of some part of the mucous membrane, and then escapes from them ; and this is all that we are able to discover." (*Précis*, *&c.* vol. ii. p. 150.) Such cases are in our opinion instances of hæmorrhage from the alimentary canal, dependent upon constitutional causes. Chomel also writes, " Thus, there are indeed cases, but still in small number, where the hæmatemesis is evidently idiopathic. The complete return to health after such an hæmorrhage leads to the conclusion that it really was idiopathic." (*Dict. de Med.* vol. x. art. HÉMATÉMÈSE.)

Dr. Watson, in the instructive lectures before alluded to, has cited a case from Hoffmann, which we consider to be an example of hæmatemesis of the active constitutional kind, and which he himself admits " exemplifies the man-

ner in which a tendency to hæmorrhage may be allied to constitutional plethora, and be fostered by individual habits of life." Cases of a similar description have also fallen under our own observation: they have almost invariably occurred in robust women, between the ages of thirty and forty, with sallow complexions and dark hair. The hæmatemesis has generally been very considerable, the quantity of blood vomited often amounting to three or four pints. No obvious cause for the occurrence of the hæmorrhage could be discovered, excepting an insufficient action of the bowels. All these individuals recovered by antiphlogistic treatment, of which active purgatives formed the principal element. When hæmatemesis presents those symptoms which lead to the conclusion that it is active in its nature and independent of structural lesions, the principles of treatment which were recommended for active constitutional hæmorrhages, may be adopted without any hesitation. In some cases where there is a threatening of a return of the hæmorrhage, it may be necessary to employ venesection: but in the majority of the cases now under our consideration, it will be found that perfect rest, freedom from mental excitement, abstinence from all stimulating food, the free administration of such purgatives as produce copious secretions from the liver and intestines, and the employment of cold or even iced drinks, will generally arrest the gastric hæmorrhage.

Hæmatemesis may certainly occur as a *passive* hæmorrhage, although it is a symptom not often witnessed in this country. When it does happen, there is a tendency at the same time to extravasations of blood in different parts of the body. Such sanguineous exudations are particularly observed in scorbutus, purpura, yellow fever, and some adynamic continued fevers of this country, in which the appearance of petechiæ on the surface of the body is a prominent feature. When hæmorrhages take place from the mucous membrane of any part of the alimentary canal, in the course of these diseases, they are not, according to Andral, indications of any primitive or idiopathic morbid condition of the membrane itself, but merely symptomatic of a more general disease, in fact of the whole mass of the blood. (*Loc. cit.* p. 151.) It is obvious that, in such cases, measures directed merely to the repression of the hæmatemesis, which is only a symptom of a more serious constitutional affection, can never be successful. Although it should be the practitioner's object to arrest the further escape of blood, and to promote its expulsion from the alimentary canal, still his principal aim should be to improve the state of the constitution, upon which this and the extravasations of blood in other parts of the body depend. The principles propounded for the repression of passive hæmorrhages in general will be in all respects applicable.

The expulsion of the blood from the alimentary canal may be accomplished by active purgatives and glysters. In such cases mercurials should be avoided. In order to repress the further escape of blood, it is proper to employ those remedies which are supposed to possess a styptic property. Small pieces of ice may be swallowed by the patient at short intervals, and sometimes with evident good results. The acetate of lead, in combination with opium, may also be administered in frequent small doses. The oil of turpentine in doses of ten, twenty, or thirty drops may be given every three or four hours. Other astringent remedies, both mineral and vegetable, may be resorted to with a much greater probability of restraining passive hæmorrhage from the stomach than from other organs. If such remedies have any direct influence on the capillaries of a bleeding surface, it is clear that in passive hæmatemesis there is a great chance of their proving successful, as they are, when swallowed, brought into immediate contact with the bleeding vessels.

The last form of hæmatemesis, independent of local physical changes of structure, is that which appears to be *vicarious* of suppressed menstrual or hæmorrhoidal discharge. This is certainly the most common variety of what has here been termed constitutional hæmatemesis, particularly in females. Hæmorrhage from the stomach, vicarious of menstruation, may continue for several months or even years, apparently without injury to the con-

stitution. Cullen has affirmed that this species of hæmatemesis is hardly ever a dangerous disease, and this opinion has been confirmed by the experience of subsequent observers. Nevertheless serious and even fatal consequences have sometimes ensued in such cases, showing the necessity of a cautious prognosis. Thus, two instances are related by Mr. North, in which suppressed menstruation was followed by repeated and at length fatal hæmatemesis. In neither of these women was the general health seriously deranged; nor, previously to the hæmorrhage, did there exist debility or any other symptom calculated to induce the apprehension of danger; in fact, in both cases a very favourable prognosis was given by experienced physicians, a very short time only before the fatal event. (*Med. Gaz.* vol. x. p. 435.)

These instances are, however, rare exceptions to the usual course of such cases. More frequently a woman, so affected at the return of each menstrual period, is attacked with some uneasiness of stomach, which is quickly followed by vomiting of blood. It is generally small in quantity, not amounting to more than a few ounces, of a darkish colour, quite fluid, and of a sour smell. The hæmatemesis subsides after a few days, when the individual recovers her usual state of health. The same symptoms recur again and again until the catamenia make their appearance, when the gastric hæmorrhage ceases altogether. A similar vicarious hæmatemesis may happen to either males or females about the middle period of life, upon the suppression of habitual hæmorrhoidal flux, and disappear when the accustomed discharge has been re-established.

The treatment of these vicarious forms of hæmatemesis consists in attempting to restore the suppressed natural discharge. The methods by which this object may be attained have been pointed out in the general article on hæmorrhage. It is only necessary again to allude to some of the resources of medical art in encouraging the return of the suppressed catamenia or hæmorrhoidal flux, and to the relief which may be given to the constitution and the probable prevention of hæmatemesis by the application of leeches in the neighbourhood of the uterus or rectum. It has been well remarked by Dr. Goldie, "that with regard to the restoration of the menstrual function, where its suspension gives rise to hæmatemesis, the means by which this is to be accomplished are rather such as act by removing a condition of the general system unfavourable to regular menstruation, than by the employment of specific emmenagogues." (*Cyc. Pract. Med.* art. HÆMATEMESIS.) It is in such cases that the late Dr. Hamilton, in his work on purgative medicines, so strenuously recommended the employment of purgatives, and numerous practitioners of the present day can bear testimony to the efficacy of that treatment.

Hæmatemesis, depending upon structural disease, is a very formidable malady. The lesion may exist in the coats of the stomach itself, or in some other organ exercising an influence over the circulation of the stomach. The principal pathological conditions of the mucous membrane of the stomach which give rise to hæmorrhage appear to be, 1. the congestive stage of inflammation of the internal or mucous surface; 2. ulceration; and 3. carcinoma of the coats of the stomach.

Hæmatemesis very rarely occurs as the consequence of the congestive stage of inflammation of the mucous surface, except when corrosive poisons are taken into the stomach, and then they induce violent inflammation and hæmorrhage to a considerable extent. This is only one of a number of serious effects produced by the introduction of such substances into the stomach; the consideration, however, of this form of hæmatemesis, and its appropriate treatment, belongs to Toxicology. Dr. Carswell has given an accurate description of the state of the mucous membrane of the stomach in that peculiar form of gastric hæmorrhage, which is produced by the irritation of poisonous substances. He states, "that isolated patches of a dark red, deep brown, or almost black colour, having the aspect of ecchymosis, are found upon the lining of the stomach. When these are examined narrowly, they are found to consist

either of blood alone, effused into the mucous and submucous tissues, or of blood and a congeries of tortuous vessels. In such situations, portions of the mucous membranes are observed in a state of sphacelus. The intervening mucous membrane may be perfectly healthy, or present a considerable degree of congestion, the tendency of which to terminate in hæmorrhage is marked by the clustering together of the capillaries in numerous points, and the effusion of small specks of blood." (*Elem. Forms of Dis.*)

Another lesion which is known to be the cause of gastric hæmorrhage is ulceration of the mucous membrane of the stomach. This sometimes consists of a number of very small superficial ulcers, extensively distributed over the surface: some of them are covered with a small dark coagulum of blood; others present a mere speck of blood, occupying, perhaps, the opening of the duct of a mucous follicle. A more uncommon and incurable lesion which gives rise to gastric hæmorrhage is that which exposes and perforates the coats of some vessel ramifying in the walls of the stomach. Andral states that such cases are extremely rare, and that not more than five or six well-authenticated instances are to be found on record. He refers to two of them. (*Loc. cit.* p. 154.) An interesting case of this kind is delineated in Dr. Carswell's work. Several ulcers had existed in the stomach, and some had cicatrised; the fatal hæmorrhage had taken place from the base of an ulcer which had perforated the coronary artery. An instance of this rare and fatal form of hæmatemesis occurred some years ago in St. Bartholomew's Hospital, among the patients under the care of Dr. Latham. This person was a middle-aged man, who stated that, for the space of two years, he had suffered from pain across his chest, vomiting after food, palpitation, and constipated bowels. He confessed that he had habitually indulged in alcoholic potations. His countenance was dusky and exsanguined. Two days before his admission, he was seized suddenly with giddiness and faintness, followed by the vomiting of two quarts of blood. He lived only three days after his admission into the hospital, and upon each day there was a return of these symptoms, with vomiting and purging of blood. Upon examination of this man's body after death, the cavities of the heart were found empty of blood, and all the great viscera bloodless. The stomach contained two pints of coagulated blood and some dirty red fluid, and about a pint of grumous blood was found in the intestines. In the smaller arch of the stomach there was a small excavated ulcer with hardened edges, and at its base the orifices of two or three branches of the coronary artery, laid open by ulceration, were visible. Another example of this rare form of hæmatemesis is preserved in the museum of St. Bartholomew's Hospital, in which a large ulcer has destroyed the mucous membrane of the stomach and part of the pancreas, and has laid open the splenic artery, from which fatal hæmorrhage occurred.

Carcinoma of the stomach is another lesion which is frequently accompanied by hæmorrhage. Under such circumstances hæmatemesis may occur as one of the earliest indications of the approach of this formidable disease, as well as in its later stages. When the submucous cellular tissue is passing into the state of scirrhus, the mucous membrane itself occasionally pours forth blood in the form of exhalation. Andral states that he has more than once found the mucous membrane of the stomach covering a mass of scirrhus perfectly healthy in individuals, who had had abundant hæmatemesis shortly before death. (*Loc. cit.* p. 153.) When it occurs at the later stages of carcinoma, it may be owing to the erosion of some considerable vessel, in the course of the destructive ulceration; or, what seems to be more common, it may result from a kind of general oozing or exhalation from the surface of the irregular ulcer, similar to that which is believed to proceed from the lining of pulmonary cavities in some cases of tubercular disorganisation of the lungs.

When hæmatemesis occurs from ulceration of the mucous membrane of the stomach, whether simply follicular or the result of carcinomatous degeneration, it is generally preceded by a long train of symptoms indicating disease of that

viscus. Nevertheless it is well known, that extensive ulceration of this mucous membrane does occasionally go on for a long period without symptoms which clearly indicate its presence. Several remarkable cases of this description are related by Dr. Abercrombie and other authors. In such individuals a sudden, copious, and fatal hæmatemesis may come on, and, after death, one or more ulcers are found in the stomach.

The treatment of hæmatemesis resulting from such lesions, resolves itself into that which is considered appropriate to the disorganisation suspected to exist in the stomach. In the majority of these cases the hæmorrhage is very abundant; and even if arrested for a few hours, generally returns and produces fatal syncope. Every effort should be made to tranquillise the general circulation, and to arrest the gastric hæmorrhage; for which purpose ice taken into the stomach is often attended with good effects. The acetate of lead in combination with opium may be given freely. All irritating styptics (as the mineral acids, or oil of turpentine) should be avoided. Whatever nourishment is taken into the stomach in such cases, should be in the form of cold liquids, and the strength of the patient upheld by nutritive glysters. This, perhaps, is the utmost that can be accomplished by medical art.

The last form of hæmatemesis to be noticed is that which may be termed *sympathetic*, in which the hæmorrhage does not depend upon disease of the stomach itself, but on some organ capable of influencing the flow of blood through the capillary system of that viscus. The viscera, the morbid alterations of which are most liable to induce hæmatemesis, are the liver and the spleen, and next, those of the lungs and uterus. All obstructions to the circulation through the liver must necessarily cause congestion of the portal vein and its tributary branches, as well as of the capillary circulation of those organs which return their venous blood through that vein. In some cases the result of this general abdominal congestion is the effusion of serum into the peritoneal cavity: in other cases the congestion is relieved by exhalation of blood from the mucous membrane of the stomach or the intestinal canal, giving rise to hæmatemesis or intestinal hæmorrhage.

Although the functions of the spleen are by no means completely understood, still, from its highly vascular, cellular, and extensible structure, it is undoubtedly capable of acting as a receptacle or reservoir for the venous blood, when its free passage through the liver or the right side of the heart is obstructed. Whenever the portal system becomes overloaded, one of its earliest effects is congestion and enlargement of the spleen. By this means congestion of the other organs within the abdomen is diminished or obviated; but the spleen will not admit of distension beyond a certain extent; and, moreover, if it be very frequently congested or remain for some time unrelieved, the consequence is the stagnation of the blood in the splenic cells and induration of its substance. It is easy to perceive that under such circumstances any accidental obstruction of the portal vein must relieve itself through other channels and it is in this way that the connection of hæmatemesis with enlargement of the spleen is explained. When gastric hæmorrhage is the consequence of disease of the spleen, it frequently acts most beneficially upon this organ, for it has been observed to diminish in bulk, as the blood was poured out from the stomach.

Dr. Watson mentions that he has witnessed this phenomenon more than once, and that he had regarded the tumid condition of the spleen as an evidence of venous obstruction elsewhere. Latour has detailed several examples of the co-existence of enlargement of the spleen with hæmatemesis. One of his patients, who had long been living in a malarious district, and who had suffered from an obstinate ague, was attacked with enlargement of the spleen, which gradually occupied nearly the whole abdomen. He predicted that hæmatemesis would probably supervene on this condition of the spleen, and accordingly he was one night hastily summoned to his patient, and found that he had vomited an enormous quantity of coagulated blood, and that a good deal had also passed off by the bowels. This hæmorrhage recurred from time to time, till in the course

of a month the enlarged spleen was so reduced in bulk that it could no longer be felt in the abdomen, and the patient lived to enjoy good health for twenty-five years afterwards. (*Med. Gaz.* vol. x.)

Mr. Twining, in his work on the diseases of Bengal, when describing the assemblage of symptoms which constitutes the endemic cachexia of tropical countries where paludal exhalations prevail, informs his readers that enlargement of the spleen is the most frequent attendant on this cachexia. The tumefaction of the spleen often takes place so suddenly, that in a few days it can be seen as well as felt extending far below the cartilages of the left false ribs. The degree of enlargement which occurs is variable; in extreme cases the diseased spleen fills more than half the abdomen, extending to the right of the navel, while its lower extremity reaches the left iliac region. Cases of this enormous tumefaction may be frequently seen in Calcutta; some of them recover. Hæmoptysis, as well as hæmatemesis, occasionally occurs in such cases, when the spleen is very large; and probably the blood which is vomited sometimes flows into the stomach from vessels communicating directly with the splenic vein, as the intumescence of the spleen has been observed in some cases to be immediately reduced by these evacuations of blood. These profuse hæmorrhages sometimes suddenly destroy life; but in other cases, when the functions of the system have not been much disordered previously, the patients recover quickly after these profuse losses of blood, the enlargement of the spleen for the time subsides, and the disease is thus entirely cured. Such instances afford us useful hints for the treatment of enlargements of the spleen when they are not of long standing.

When hæmatemesis can be ascribed to morbid conditions of the liver and spleen, the hæmorrhage is apt to recur; perhaps there is no form of hæmorrhage, with the exception of uterine, which reduces the patient to such a bloodless condition; the aspect of individuals who have thus suffered is so striking, that it is often sufficient at once to indicate the real nature of the case.

The treatment of hæmatemesis depending on morbid conditions of the liver and spleen consists in the employment of remedies directed to those viscera. It is better to anticipate the extravasation of blood by local depletion over the liver or spleen, by the application of cupping glasses or leeches. Purgatives may at the same time be freely employed, with the other measures recommended for organic diseases of the liver and spleen.

Examples of what has here been called sympathetic hæmatemesis are sometimes met with in the advanced stages of pregnancy. The want of periodical recurrence, and the complete absence of the hemorrhage during the early months of pregnancy, are circumstances which sufficiently refute the opinion once entertained, that this form of hæmatemesis was supplementary of the suppressed catamenia. Such cases of hæmatemesis seem to be occasioned by mechanical obstruction to the circulation through the abdominal aorta and the iliac arteries.

Lastly, any morbid condition of the thoracic viscera capable of obstructing the circulation, if it come on rapidly and be not relieved by art, may excite congestion and hæmorrhage from the mucous membrane of the stomach, but such cases are uncommon.

HÆMORRHAGE FROM THE INTESTINES.

Symptoms and source of the hæmorrhage. — Characters of the effused blood. — Prognosis. — Causes. — Constitutional disturbance and structural lesions. — Intestinal hæmorrhage may be active, passive, or vicarious.— Symptoms and treatment of these forms. — May originate in connection with organic lesions, viz. inflammation of the intestinal mucous membrane. —Ulceration. —Carcinoma. — Diseased liver and spleen.—Symptoms and treatment of these forms.

In intestinal hæmorrhage the blood may be effused from a more or less extensive portion of the intestinal mucous membrane, or from a limited portion only. In the former case, in which the effused blood is intimately blended with the secretions, giving them a very dark or almost black colour, the disease has been termed *Melæna* (from μέλαινος, signifying black).

The early *symptoms* of melæna are by no means so striking nor so easily recognised as those of hæmatemesis; indeed, it not unfrequently happens that cases of simple melæna, or purging of dark blood, may continue for some time without the individual being aware of it. The pale sallow face, the bloodless conjunctiva, the blanched lips, the yellow tawny flabby tongue, the thrilling pulse, immediately arouse the suspicion of internal hæmorrhage. If the evacuations be examined, they are offensive and dark-coloured, or black as pitch.

Upon further inquiry, it will generally be discovered that the individual has experienced some uneasiness, sense of weight, or dull pain at the epigastric or hypochondriac regions; tormina and relaxation of the bowels, preceded by constipation and frequent sensation of faintness and exhaustion. The abdomen is often, at the same time, full and tender, particularly in the epigastric region, and in many cases careful examination detects an enlarged viscus, with more or less local tenderness.

Whenever an opportunity is afforded of inspecting the stools, the existence of hæmorrhage from the bowels is at once discovered. But some doubts may arise as to the particular part of the alimentary canal which is the source of the hæmorrhage. It has already been stated, that where hæmorrhage takes place from the stomach in small quantities, no hæmatemesis may ensue, and the effused blood will pass the pylorus, and thus give a dark hue to the stools. It would be extremely difficult, in such a case, to pronounce whether the blood had been poured out from the mucous membrane of the stomach, the duodenum, or the jejunum. It would be the preponderance of gastric over intestinal disturbance which would lead us to the conclusion that the blood escaped from the stomach. On the other hand, the blood may have escaped from the hæmorrhoidal vessels.

There are several symptoms which tend to distinguish melæna from the hæmorrhoidal flux. The blood which escapes from the hæmorrhoidal vessels is generally of a florid red colour, and passed after the natural evacuations; but, in melæna, the stools are black, or nearly so, and the blood is intimately blended with the evacuations. The pain and uneasiness in melæna is felt throughout the abdomen, while in the former these symptoms are confined to the rectum.

The quantity of blood which passes from the intestines in melæna is very uncertain, and never equals that which is poured forth from the stomach by hæmatemesis; indeed the blood is generally so intimately mixed with the intestinal secretions, that it is difficult to estimate its amount accurately. In some cases, where the blood seems to escape almost entirely from the mucous membrane of the lower bowels, half a pint to a pint may be passed each time the person goes to stool for several days in succession.

The quality of the blood is generally very peculiar and remarkable; its colour is often so dark, or almost black, that the stools resemble pitch. The intense blackness and pitchy character of the stools in melæna have caused some authors to doubt whether these evacuations really do consist of altered blood.

Dr. Ayre, in his *Treatise on Marasmus*, has contended, that as traces of lesion in the intestinal mucous membrane are so very rare in cases of melæna, that the black discharges are not the result of hæmorrhage from the mucous membrane of the intestines, but are derived from the minute ramifications of the portal vein in the glandular texture of the liver. He argues that a certain degree of congestion of that important organ will occasion an excessive secretion of vitiated bile, constituting the common autumnal cholera, and the various modifications of bilious complaints; but that when this hepatic congestion occurs to a still greater extent, the secreting ramifications of the vena porta no longer eliminate bile, but pour forth a dark and highly carbonised blood, unchanged into secretion; that this dark fluid passes through the minute biliary pores, and is conveyed through the common excretory hepatic ducts to the duodenum, whence it either regurgitates into the stomach, or is carried downwards along the intestines. Dr. Ayre therefore conceives that melæna differs but in degree, in the pathological condition which occasions its symptoms, from cholera and other bilious disorders.

This explanation of the origin of the phenomena of melæna is certainly ingenious, but must be regarded merely as an hypothesis. Dr. Ayre has not supported this view by the only evidence which can be satisfactory, namely, the detection of such morbid hepatic secretions in the biliary ducts. On the other hand, morbid anatomy has frequently revealed the presence of dark blood in the intestinal canal in those cases where, during life, these dark stools had been observed to pass from time to time. It is true that cases do occur in which the stools consist almost entirely of dark, black, or greenish black bile, of the consistence of treacle, closely resembling the stools of melæna. If this colour of the stools be caused by vitiated bile, the addition of water will impart to them a greenish or greenish yellow hue; if it be dark blood, the addition of common salt (chloride of sodium) will impart a blood-red colour to the evacuations, thus indicating an admixture of blood. Melæna, when it occurs alone, is not so fatal as uncomplicated hæmatemesis; this difference arises partly from the quantity of blood lost being less, and partly that it does not so often arise from structural lesion of the mucous membrane.

With reference to the frequency of the disease, it is difficult to give any certain information. There certainly are more constitutional affections which are attended with intestinal than with gastric hæmorrhage. In warm climates it is very common, particularly in those countries where dysentery is endemic. Even in England there sometimes appears an epidemic tendency to melæna. Thus, during the autumn of 1838, a large number of persons among the out-patients of St. Bartholomew's Hospital complained of severe pains in the bowels, with purging of dark matter, which some described distinctly as blood, others as dark fluid like pitch. The number was so much above the usual average of such cases as to excite a suspicion of an epidemic tendency to hæmorrhage from the bowels. During the same period, the number of cases of ordinary autumnal cholera was less than usual. This tendency to intestinal hæmorrhage is also corroborated by the analogous phenomenon, that dysentery was, during the same period, prevalent, almost as an epidemic, on board the Seaman's Hospital Ship in the river Thames.

With respect to the mode of escape of the blood from the vessels of the mucous membrane of the intestines, little can be added to what has already been stated on this point in discussing hæmatemesis. Intestinal hæmorrhage offers additional proof of the frequency of the escape of the blood by exhalation, and not from ruptural vessels.

When cases of melæna terminate fatally, it is much more common to find the mucous membrane of the intestines entire, than with any abrasion of surface. It may be red, from congestion of its vessels, or it may be quite pale, the escape of the blood having entirely removed all appearances of congestion. Sometimes, the whole track of the canal is found covered with grumous blood, and the mucous membrane evidently stained by the imbibition of the coloured particles of the blood after death.

Occasionally the orifices of the mucous follicles appear like small black spots scattered thickly over the surface; the membrane looks as if it had been sprinkled with soot. Sometimes a small quantity of blood may be expressed from the orifices of these mucous follicles.

The lesions of the intestinal membrane, which are sometimes found in connection with melæna, will be described under the causes of intestinal hæmorrhage.

Causes. It is important in cases of melæna, as well as in hæmatemesis, to distinguish, with as much accuracy as possible, the nature of the cause which gives rise to the hæmorrhage. It is evident that on such careful discrimination alone can a rational pathology of the case, or a judicious system of treatment, be attempted. It is sometimes associated with the usual symptoms of an active constitutional hæmorrhage. It is in the course of continued fevers that this form of bleeding from the bowels is most commonly met with; the older physicians were in the habit of regarding these discharges of blood as critical evacuations, and were unwilling to interfere with them. In the present day physicians are in the habit of regarding them merely as indications of congestion of the mucous membrane of the bowels, which has relieved itself without the intervention of art. If such discharges of blood from the bowels be excessive, those means of controlling them may be adopted, which have been pointed out as suitable in other active hæmorrhages. If the quantity discharged be moderate, the hæmorrhage requires but little interference. The blood poured out in such cases is usually fluid, of a darkish red colour, and does not partake of those peculiar characters observed in melæna.

Intestinal hæmorrhage, and discharge of dark blood with the stools, may present itself with all the characters of a passive hæmorrhage. It is in those constitutional affections, where the whole mass of the blood has become vitiated, that we meet with this form of intestinal hæmorrhage; it occurs particularly in scorbutus, purpura hæmorrhagica, in fevers of the petechial type, and malignant small-pox. The loss of blood from the bowels adds materially to the gravity of the constitutional affection, and should always be arrested as soon as possible. The treatment of this form of intestinal hæmorrhage is necessarily subordinate to that pursued for the improvement of the state of the constitution on which it depends. The remedy which has acquired the highest reputation in the treatment of this passive melæna is the oil of turpentine in doses of ♏xx, given every six or eight hours. Occasional doses of very mild aperients are also beneficial.

Melæna is very commonly met with as a vicarious discharge where the catamenial secretion has been scanty, or altogether suppressed. Such cases are generally combined with hæmatemesis, and present some of the least alarming and most tractable forms of hæmorrhage from the alimentary canal. The immediate symptom of intestinal hæmorrhage may generally be removed by the free exhibition of purgatives. When this is accomplished, the return of the natural periodical discharge should be promoted by those remedies which have already been recommended as efficacious in the treatment of vicarious hæmorrhages in general, and vicarious hæmatemesis in particular.

We have, lastly, to point out the various organic lesions which give rise to intestinal hæmorrhage, whether they be situate in the alimentary canal or elsewhere. Inflammation of the mucous membrane of the intestines may be attended with escape of blood from its vessels both in the early and at the more advanced periods, when it has terminated in ulceration. The former is of rare occurrence, and of little importance, and generally soon yields to the remedies which are employed to control the inflammation. The intestinal hæmorrhage, resulting from ulceration of the mucous membrane, in cases of dysentery, continued fever, or invagination of a portion of intestine, is a most formidable and fatal symptom. The quantity of blood lost in such cases is often very considerable, and passes from the bowels very little changed. The individual, however, is reduced to the most imminent danger, and sometimes

expires shortly after passing a large quantity of blood. In such cases the mucous membrane of the bowels is found after death more or less extensively ulcerated. In fever, the ulcerations are generally situated in the lower third of the ileum, while in dysentery the lining of the colon is to a greater or less extent disorganised.

The treatment of such cases must consist in the most rigid diet, carefully avoiding all substances which can prove irritating. Opium may be employed freely, as it is desirable to lessen the peristaltic motion of the intestines. Every effort should be made to keep the whole alimentary canal as much as possible in a state of repose, and thus allow of the processes of reparation to go on uninterruptedly.

Purging of blood is also connected with carcinomatous ulceration of the intestines. The hæmorrhage recurs from time to time, accompanied with other symptoms denoting disorganisation of the coats of the intestines. Such cases often at first appear to yield to treatment, but this apparent amendment is fallacious, as the symptoms return, and proceed, sometimes speedily, to a fatal termination.

The last form of melæna to which it appears necessary to advert, is that which affords an example of sympathetic hæmorrhage, where the congestion and exhalation from the mucous membrane depends on disease of the liver or spleen.

Persons in the middle periods of life, who are labouring under hepatic congestion and constipation, are sometimes attacked with profuse hæmorrhage from the bowels. The blood in such cases is generally dark and fluid, and appears to come from the large intestines exclusively. The treatment of such cases consists almost entirely in the exhibition of mercurials followed by aperients, especially castor oil. When free evacuations are obtained, the discharge of blood generally ceases. The hæmorrhage, however, often continues for several days, and occasions considerable alarm and depression of spirits, but ultimately the patient does well.

Inflammation of the substance of the liver, when it is extensive, and where bloodletting has not been employed sufficiently, is occasionally accompanied by bleeding from the intestines. The blood is dark and fluid, but not usually of the dark pitchy appearance which characterises true melæna; the absence of such changes in the effused blood may be accounted for, by the blood being expelled shortly after its extravasation by the purgatives employed in the treatment. It is obvious that in this class of cases the measures adopted to control the hepatitis will be sufficient to arrest the intestinal hæmorrhage.

Any other structural disease of the liver, which pervades that organ very extensively, and which particularly affects the ramifications of the vena portæ, may be accompanied by occasional hæmorrhage from the stomach or intestines, or from both. In these cases the blood discharged is dark and grumous, the stools presenting all those characters which constitute true melæna. This form of melæna occurs principally in persons of broken-down constitution, and who have been addicted to spirit drinking. It is often complicated with, or succeeded by, ascites, and is one of the most alarming and incurable forms of intestinal hæmorrhage. In such individuals, the free and indiscriminate employment of purgatives cannot be borne; and, unfortunately, in such persons the kidneys often exhibit symptoms of serious disorganisation. The means by which the constitution may be relieved are restricted within a very small compass, and it requires the utmost skill of the practitioner to meet the successive emergencies of the case. Upon some occasions it is prudent to deplete locally by the abstraction of blood near the liver; at other times mercury and purgatives, or perhaps diuretics, are indicated.

Enlargements of the spleen are frequently accompanied by hæmorrhages from the whole mucous membrane of the alimentary canal. The pathology of these cases has been enlarged upon in the description of hæmatemesis, and little more remains to be added here. The blood discharged from the bowels has the peculiar melanoid characters. There is often at the same time considerable xhaustion of the vital powers. When the strength of the patient will admit of

the treatment, local depletion over the spleen and the free use of purgatives are to be employed. Preparations of mercury are not borne so well as in melæna arising from disease of the liver, besides that salivation is easily induced. It is not uncommon to observe purpurous spots on the skin in conjunction with melæna and enlarged spleen, a pathological condition, which indicates a vitiated state of the blood. Nevertheless this variety of melæna is not so incurable nor so fatal as that connected with diseased liver.

HÆMORRHAGE FROM THE URINARY ORGANS, OR HÆMATURIA.

Derivation and signification.— Characters of bloody urine.— Substances taken as food impart a red colour to the urine.— Other deceptive appearances. — Tests for the presence of blood in urine.— Sources of the blood.—Urethral hæmorrhage.— Vesical hæmorrhage.— Renal hæmorrhage.— Diagnosis.— Causes.— Peculiar states of the constitution.— Local lesions —active—passive—vicarious.— Symptoms and treatment. — Hæmaturia arising from morbid conditions of the urinary organs. — Symptoms and treatment.

Hæmaturia (derived from the Greek words αἷμα, blood, and οὐρέω, I pass urine) signifies the discharge of bloody urine. According to its strict etymological sense, this term should be restricted to those cases in which blood, having been effused within the urinary organs, is discharged, mixed with the urine. In the present day, however, hæmaturia is generally understood to express any hæmorrhage from the urinary organs.

The same objections, which have been raised against the employment of the word hæmatemesis to designate gastric hæmorrhage, apply with equal force to the use of the term hæmaturia, to signify hæmorrhage from the urinary organs.

Hæmaturia is a much more uncommon form of hæmorrhage than that which takes place from the lungs or alimentary canal ; and as it rarely terminates fatally, its pathology is by no means established on such satisfactory proofs as that of hæmorrhages from these latter parts. In a supposed case of hæmaturia, the first point of inquiry is, to ascertain whether the blood is actually mingled with the urine. When blood is passed from the urinary organs in very considerable quantities, there can be very little difficulty in recognising its presence; but when the proportion of blood is scanty, when it is intimately blended with the urine, when this secretion contains an excess of lithic acid and its compounds, whereby the characters of the colouring matter of the blood are materially changed ; or when the urine contains pus, mucus, or bile,— it requires some attention and knowledge of animal chemistry to pronounce with certainty on the existence of blood in the urine.

When blood is passed in very considerable quantities from the urinary organs, after remaining a short time in the vessel into which it has been voided, it coagulates into a consistent gelatinous-looking mass, not unlike red-currant jelly, particularly when a portion of it is viewed by transmitted light. This gelatinous mass afterwards separates into a smaller clot, resembling the crassamentum of the blood, and into a reddish serum, which gradually deposits a quantity of blood globules. If the colourless fluid which afterwards remains be exposed to heat, a quantity of albumen may be readily detected by its coagulation. The appearance of a large quantity of blood in the urine is, however, an extremely rare occurrence.

But a considerable quantity of blood may be passed, intimately blended with the urine, and not present such unequivocal proofs of its real nature. The urine may be turbid, of a chocolate or coffee brown, or almost black colour. There is no distinct separation of the fluid into crassamentum and serum, as in the class of cases just mentioned, but it partially separates into a grumous sediment, consisting of flocculi of fibrin mixed with the red particles and a super-

natant fluid, which retains some of the colouring matter of the blood. If this semi-transparent fluid be heated to 160° Fahr., it gradually becomes turbid, and at last exhibits an abundance of coagulated albumen. When bloody urine is voided of these different shades of brown colour, it is generally found to contain an excess of free acid, which it is well known has the peculiar property of changing the colouring matter of the blood to brown or black.

A very common appearance of the urine when it contains blood, is that of a clear reddish fluid with a number of colourless flakes or shreds floating through it. These colourless shreds are undoubtedly the coagulated fibrin of the blood, which has assumed various forms in its passage through the urinary organs and their excretory ducts. Sometimes those coagula are perfectly cylindrical, and bear considerable resemblance to intestinal worms. The serum after a time deposits the coloured particles, and, if it be subjected to the test of heat, it generally affords unequivocal proofs of its holding in solution the albuminous parts of the blood. When the urine presents these characters, there can be no doubt that it contains blood, and that it has been effused gradually from some point near to the kidney itself.

When the blood exists in the urine in smaller quantities, or when hæmaturia occurs in the course of purpura, malignant confluent small-pox, scarlatina, or typhoid fevers, the urine is voided of a dark red or brownish colour; it is less transparent than healthy urine; the fibrin does not separate as in the above-described instances, but a certain quantity of the colouring particles of the blood is gradually deposited. Such urine sometimes exhibits an acid, at other times an alkaline or neutral condition; and it will greatly depend upon the condition of the urine, whether the application of heat renders it more turbid, and ultimately produces the coagulation of the albuminous constituents of the blood. In such cases there may be some difficulty in pronouncing with certainty on the presence of blood in the urine.

We are not, however, in every case to presume that urine of a red colour, or of a very dark hue, derives its peculiar tint from the admixture of a portion of blood. The urine may be quite red or almost black, and yet perfectly free from admixture of blood. Dr. Watson has adverted to several substances, which, when taken as food, invariably impart a red colour to the urine. (*Med. Gaz.* vol. x. p. 470.) One of these is the prickly pear or Indian fig, as it is commonly called, the *Cactus opuntia*. When the Spaniards first took possession of America, many of them were alarmed by observing that they made what they supposed to be bloody urine; but it was soon discovered that this was owing to the abundant use of that fruit. Other travellers in America have observed a similar phenomenon. No inconvenience apparently resulted from this condition of the urine. It would appear that the juice of this plant may be analysed into a crimson dye, by other processes besides that of the cochineal insects. Another vegetable substance, which is consumed in large quantities by some persons, and which is said to produce the same effect, is beetroot. Desault relates the case of a person who observed that every morning he passed urine of a deep red colour, exactly like that which results from mingling blood with the urinary secretion. No deposit took place from the urine. The man, alarmed at the idea of passing blood, consulted M. Roux, who, after some examination, suspected that the urine owed its red colour to some other cause than admixture of blood. In fact it was ascertained, that this person was in the habit of supping every night on the red beetroot: when this article of diet was relinquished, M. Roux found that the urine resumed its natural appearance. A similar change in the colour of the urine is said to be produced by the use of madder as food, by some species of strawberries, and by drinks made of sorrel. It is necessary to be aware of the effects of such articles upon the urine, which might otherwise be mistaken for formidable disease of the urinary organs. Again, by resorting to such artifices, impostors may easily feign serious disease, and thus obtain admission into charitable institutions, or procure exemption from services which are disagreeable to them. It has already been stated that bloody

urine is often of a dark brown or even of a black tint, and this colour is produced by the action of a free acid in the urine on the colouring particles of the blood: but urine may acquire a mahogany brown or even black colour, from other causes besides the admixture of blood with it. In severe cases of jaundice, and in all diseases of the liver where the bile does not pass into the intestines, the urine is frequently found to present this dark hue. This simply arises from the concentration of the natural yellow tint of the bile, which in such cases exists in large quantities in the urine. When this dark urine is diluted with water, it immediately assumes a bright yellow colour.

Another, but very rare, cause of the dark colour of the urine is the presence of a peculiar principle, to which Dr. Marcet gave the name of melanic acid. With these exceptions, when the urine is of a dark brown or blackish colour, it owes that quality to the circumstance of its containing blood. In all doubtful cases, however, a few simple tests will, in general, prove with sufficient accuracy the presence of blood in the urine. When blood exists in the urine in small quantities, it becomes less transparent than natural; and upon the application of heat, more turbid, in consequence of the coagulation of the albumen. If a piece of white linen be immersed in bloody urine, it imparts a reddish tinge, not easily mistaken. When urine is of a reddish colour from the excess of lithic acid, it is transparent when voided, but deposits a sediment on cooling, which sediment may be redissolved upon heating the urine.

The seat of the hæmorrhage in hæmaturia will be determined by a careful observation of the nature and appearances of the effused blood, and of the symptoms which precede and accompany the excretion of it.

Urethral Hæmorrhage. This is easily recognised. When pure blood comes away in drops or a scanty stream, unmixed with urine, and neither preceded nor accompanied by any desire to pass urine, it may be inferred that the urethra is the seat of the extravasation. In such cases, when the urine is passed, it is limpid, and free from any notable bloody tinge; the small quantity of blood, which the urine carries along with it in passing through the urethra, not being sufficient to produce any perceptible change in its colour. Pure blood, which escaped from the urethra before the expulsion of the urine, will again make its appearance after the bladder is emptied.

Besides, bleeding from the surface of the urethra is generally the consequence of some mechanical injury of the lining membrane of that canal. A very remarkable case is cited by Dr. Watson, which renders it probable that blood is sometimes exhaled in considerable quantities from this membrane, when causes which produce a strong determination of blood to this part have been in operation. Thus, a young man was admitted into the Middlesex Hospital, with hæmorrhage from the urethra, who said that he had lost a considerable quantity of blood in this manner in the course of a few hours. The hæmorrhage appeared to have been the immediate consequence of an excessive indulgence in sexual intercourse, he having passed the preceding night in company with a female. The bleeding was permanently arrested by the introduction of a bougie, which was allowed to remain a short time in the urethra.

Vesical Hæmorrhage. Hæmorrhage from the bladder is of more common occurrence than that from the urethra. There are many causes which may operate either directly or indirectly on that viscus, and excite bleeding from its mucous membrane. Sometimes the blood is poured out in very small quantities, at other times the hæmorrhage is very profuse. In the former case the urine is only slightly tinged with blood, while pure blood and mucus follow its expulsion. At the same time there is pain in the situation of the bladder, often extending along the urethra, accompanied with frequent and urgent desire of micturition. With these symptoms of disease or irritation of the bladder, there is an absence of symptoms referrible to the kidneys or ureters. When the vesical hæmorrhage is profuse, it very soon produces a series of most distressing symptoms. While the serous portion of the blood passes off of a dark brownish colour, the remainder coagulates in the bladder, and becomes a source of inconvenience, suffering, and even danger, to the patient. At first there are the feel-

ings of dull pain in the hypogastric region, and weight at the neck of the bladder; afterwards, all the symptoms of retention of urine appear, and lead very generally to a fatal termination, when the bladder is found distended by a large coagulum of blood. The formation of such a coagulum may be suspected when the patient suddenly passes a quantity of pure blood, which is followed by the expulsion of dark brown urine, depositing a coloured sediment, and the supervention of the symptoms above described.

When there are symptoms of stone in the bladder, or disease of that viscus can be ascertained, and when the passage of pure blood is followed by the discharge of bloody urine, there can be little doubt that the bladder is the seat of the hæmorrhage; and this diagnosis will be corroborated by the absence of symptoms referrible to the kidneys and ureters.

Renal Hæmorrhage. When hæmorrhage from the kidney is not very abundant nor rapid, the blood is discharged intimately blended with the urine: when blood is passed from the kidney in greater abundance, the fibrinous portion coagulates as it passes towards the bladder, and then the urine not only has a reddish or darker hue, but contains coagula, often having the mould of the excretory ducts. This appearance is generally considered characteristic of renal hæmorrhage, or of escape of blood towards the commencement of the ureter.

The bleeding may be presumed to come from the kidney, or the commencement of the ureter, when there is a sensation of heat or of weight, or some degree of pain in the situation of one kidney; and this presumption is strengthened if calculi have been previously passed from the kidney, and if there be no symptom of stone or other disease of the bladder.

There is a still greater certainty as to the source of the hæmorrhage in hæmaturia, when there are symptoms which denote the passage of concretions from the kidney, through the ureter, to the bladder. There are sharp intermitting pains in the loins and abdomen, following the course of the ureter, and radiating to those parts receiving filaments from the lumbar plexus of nerves, particularly to the thigh and testicle. Nausea and vomiting are frequent concomitants.

It appears, then, that in many instances the appearance of the blood, taken in conjunction with the local symptoms, points out, with tolerable precision, from what part of the urinary organs the hæmorrhage occurs; but many cases of hæmaturia are undoubtedly obscure with reference to the actual source of the hæmorrhage. Blood may appear mixed in greater or less quantity with the urine, without pain or other symptom to lead us to fix upon one part rather than another, as the source of the hæmorrhage. It is the opinion of Dr. Watson, "that hæmaturia bearing this indeterminate character is generally found to be renal, and to depend upon calculous disease." (*Med. Gaz.* vol. x. p. 472.) This opinion was also evidently entertained by Dr. Heberden in the following passage in his *Commentaries:*—"Urine made of a deep coffee colour, or manifestly mixed with a large quantity of blood, has within my experience been very rarely the effect of any thing but a stone in the urinary passages. I therefore suppose a strong probability of this cause, whenever I see this appearance." In the few cases of severe hæmaturia which have fallen under our observation, the local symptoms have certainly been ambiguous, but they have rather led to the suspicion of some cause of irritation, as a calculus in the kidneys.

The symptoms which accompany hæmorrhage from the bladder are generally much more marked than those which attend on renal hæmorrhage. Calculus in the bladder, or serious disease of that viscus, cannot long remain without affording manifest symptoms, and certainly could not induce hæmorrhage from the mucous membrane without the patient suffering, at the same time, many other most painful symptoms. But calculi form in the pelvis of the kidney, and malignant disorganisation may be going on in its substance without symptoms indicative of their existence. It will strengthen the presumption that the kidney is the source of the hæmaturia, if it has succeeded a fall, strain, or blow upon the back, or perhaps a long ride on horseback.

It will be inferred from the preceding remarks that the diagnosis of the source of the blood in hæmaturia, founded on the local symptoms, is far from being conclusive.

Cases of hæmaturia present examples of the different modes in which hæmorrhage takes place from the respiratory and alimentary canals. Sometimes it may be traced to some peculiar condition of the constitution; in other instances, to the operation of purely local causes.

Constitutional or idiopathic hæmorrhage from the urinary organs is, undoubtedly, rare, but there is reason to suppose, that the mucous membrane of the bladder, ureters, and pelvis of the kidneys may occasionally take on the same morbid action as the lining of the respiratory and alimentary tubes, and give rise to exhalation of blood from their surface.

The extreme rarity of idiopathic hæmaturia cannot be more forcibly expressed than by stating, that that accurate observer of diseases, Dr. Cullen, doubted of the existence of idiopathic hæmaturia. Frank, also, informs his readers, that out of 4000 patients treated by him in the clinical wards of the Hospital of Pavia, he had only observed six cases of spontaneous hæmaturia. (*De Cur. Hom. Morbis*, vol. i. pt. ii. p. 256.) Of the annual average of 4000 out-patients treated by the writer at St. Bartholomew's Hospital, not more than one or two cases of idiopathic hæmaturia have been met with.

However rare such cases may be, all the best writers on this subject admit the existence of hæmaturia independent of structural disease of the urinary organs. Dr. Watson states (*Med. Gaz.* vol. x. p. 469.), that renal hæmorrhage may occur independent of any discernible disease or change of texture in the kidneys themselves. It sometimes appears to be the consequence of a determination of blood to those organs, taking place without any obvious or intelligible cause.

Dr. Willis maintains the opinion, that hæmaturia does appear now and then with all the characters of a peculiar and independent affection, and that he had recently met with a case which he regarded as idiopathic, and viewed as though the discharge of blood constituted the sum of the affection. (*On Urinary Diseases*, p. 176.) Andral, also, admits the existence of hæmaturia depending wholly on constitutional causes. (*Précis d'Anat. Path.* vol. i. p. 339.)

The disease sometimes presents all the characters of an active constitutional hæmorrhage: it is also met with as a passive hæmorrhage, or it may appear as supplemental or vicarious of other natural or habitual discharges of blood.

With respect to the treatment of cases of active exhalation of blood from the urinary organs without discoverable disease, nothing more can be suggested than to pursue the plan which has been already recommended for other active constitutional hæmorrhages.

A much more alarming form of hæmaturia is that which bears the character of a passive constitutional hæmorrhage, and which occurs in the progress of those diseases which affect the system at large, especially scorbutus and purpura hæmorrhagica. Such cases generally terminate fatally. Andral states that he was in attendance upon an old woman suffering from a cancerous affection of the stomach, and that, a fortnight before her death, numerous purpurous spots appeared upon the skin, and at the same time a notable quantity of blood escaped daily with her urine. After death, purpurous spots were found on the pleura, peritoneum, in the alimentary canal, and on the lining of the heart. A bloody fluid filled the pelvis and ureter of each kidney, and when the tubular portions were pressed, a similar fluid exuded. A liquid dark blood was found in the heart and great bloodvessels, and without any appearance of coagulation.

Hæmaturia appears also, though rarely, as a passive hæmorrhage in the course of typhus fever, malignant small-pox, measles, scarlet fever, and plague. In these diseases it is to be regarded as a fatal symptom.

When bloody urine is voided in the course of these several constitutional affections, the mere hæmorrhage from the urinary organs is not so much the symptom to be combated, as the general condition on which it depends. The

treatment, therefore, of the hæmaturia is wholly absorbed in that most suitable for the general constitutional disturbance.

When hæmaturia appears as a vicarious hæmorrhage supplemental of hæmorrhoidal or menstrual discharge, the blood is generally effused from the inner coat of the bladder. In obstinate cases of hæmaturia, and particularly when it recurs from time to time, inquiry should be made as to previous hæmorrhages from the rectum, and, in females, as to the state of the catamenial function. Some modern French writers on this subject state, that elderly females sometimes pass bloody urine in considerable quantity at intervals, after the complete disappearance of the catamenia. One of these writers had under his care an elderly woman whose general health was good, but who passed a considerable quantity of blood with her urine nearly every month. This hæmorrhage was preceded by heat and uneasiness in the hypogastric region, some general indisposition, with headach; these symptoms vanished as soon as the hæmaturia commenced, and she remained perfectly well, in spite of very active habits of life, until the expiration of the usual period. (*Dict. de Méd. et Chir. Prat.* art. HEMATURIE.)

In such cases the object of treatment is to restore, if possible, the suppressed hæmorrhage: this is often a difficult undertaking, because the means to be employed sometimes increase the discharge of blood from the urinary passages. The oil of turpentine, the tincture of cantharides, or the muriated tincture of iron, employed cautiously and in very small doses, will be found most efficacious in controlling the hæmorrhage. When there is local pain or irritation, sedatives, as, for example, the uva ursi, opium and warm baths are of service.

Lastly, hæmaturia frequently arises from morbid conditions of the urinary organs themselves. There are several diseased conditions of the kidney under the influence of which blood is poured out from that organ and mixed with the urinary secretion.

In inflammatory dropsy with albuminous urine, and in that form of dropsy which supervenes during the convalescence from scarlet fever, it is by no means uncommon to observe a certain quantity of blood, or its colouring and albuminous principles, excreted with the urine. When such cases terminate fatally the kidneys are usually found intensely congested with blood. Again, blood is sometimes mixed with the urine in inflammation of the kidney, and likewise during the progress of carcinomatous or other malignant degeneration of its substance; but a much more frequent cause of renal hæmorrhage is the irritation occasioned by the formation of a calculus in the pelvis of the kidney. The irritation produced by the constant growth of the calculus will excite intense congestion of the surrounding mucous membrane, which relieves itself by the exhalation of blood: at other times, the enlargement of the calculus or its change of position causes laceration or ulceration of the surrounding highly vascular parts. The calculus, in its descent to the bladder, may in a similar manner excite hæmorrhage from the lining of the ureter.

Hæmaturia may be the consequence of some morbid state of the urinary bladder. A calculus may have descended from the kidney into this viscus, or it may have had its commencement there: under either circumstances, it may occasion hæmorrhage from the mucous surface of the bladder.

Inflammation of the mucous membrane of the bladder is another cause of the appearance of blood in the urine. This affection sometimes appears almost as an epidemic, and especially in hot climates. M. Renoult has described a troublesome and obstinate hæmaturia which affected numbers of the French troops in Egypt, and particularly the cavalry. It was attended with much pain in the region of the bladder, extending along the urethra to the extremity of the glans penis, with a frequent and urgent inclination to pass urine. The last drops voided consisted often of pure blood, and their expulsion was accompanied by acute pain. Several of these men died, and on dissection the mucous membrane of the bladder was found inflamed. The same disease appeared among the horses. (*Dict. de Méd.* vol. ix. art. HEMATURIE.) Similar

affections occur to couriers and others who perform long and rapid journeys on horseback. The diagnosis of the seat of the hæmorrhage is easy, and the treatment is involved in that which is appropriate for the cystitis. Chronic disease of the mucous membrane of the bladder, whether simply inflammatory or of a malignant nature, will give rise to occasional hæmorrhage from its surface. In some of these cases, only a small quantity of blood, mixed with puriform mucus, passes after the urine is voided; in others the quantity of blood poured out is very considerable, and produces serious inconvenience. A case of this latter description occurred to the late Mr. Heaviside. An old East Indian, who had long been subject to nephritic complaints, was suddenly seized with symptoms resembling retention of urine. A catheter was passed, but as no urine flowed, it was supposed that the instrument had not entered the bladder, in which region there was a manifest tumour. The patient died the next day, and the bladder was found distended by a very large coagulum of blood, which had come from its diseased mucous membrane. There was no trace of escape of blood within the kidneys or ureters.

The treatment of Hæmaturia has not been detailed at any length, because it has been our object to show that when it occurs as an idiopathic hæmorrhage the attention is to be directed to the state of constitution; and where it is a symptom of a morbid condition of the urinary organs, it will be most successfully combated by judicious management of the local affection on which it depends.

HÆMORRHAGE FROM THE UTERUS.

Definition.—Active and passive menorrhagia.—Symptoms and treatment.—Occurring during pregnancy and parturition.—Causes and treatment.—Resulting from structural diseases of the uterus.

The periodical escape of a bloody fluid from the vessels of the uterus is an indication of a healthy and robust constitution. When it is limited to a certain quantity, varying from two to six ounces in different individuals and climates, and recurring every lunar month, for about thirty years after the age of puberty, in the unmarried female, it cannot be regarded as a pathological phenomenon, but constitutes natural menstruation, the healthy function of the unimpregnated uterus. When, however, the natural menstrual fluid is excessive in quantity, or when blood escapes from the gravid uterus, or where it flows in large quantities from that organ immediately after parturition, or when the substance of the organ is diseased, the affection is termed uterine hæmorrhage, the various forms of which we shall briefly advert to.

That variety of uterine hæmorrhage which is termed menorrhagia consists in a morbidly profuse menstruation, and may occur in very opposite states of the system. It may present itself either as an active or passive hæmorrhage. In active menorrhagia, for a few days before the expected menstrual period, there is a sensation of unusual fulness about the pelvis, with throbbing sense of heat and weight referred to the situation of the uterus; the external organs of generation are often slightly swollen, and the mammæ become hot, tumid, and tender; the pulse is accelerated, the mouth hot, the tongue dry; the patient is thirsty, and there is a general feeling of oppression, with headach and giddiness. The discharge from the commencement comes on with violence, often in gushes of pure blood, as is proved by its coagulation, and the pain experienced from the passage of the coagula. Sometimes, after the first few hours, the woman feels relieved, lighter and cooler; and the rest of the period proceeds as in healthy menstruation. In more aggravated cases, the flow still proceeds in equal or increased quantity, and lasts for several days, occasionally intermitting, but again bursting forth upon the slightest exertion, till at the end of the period she is left weak and languid, with a feeble pulse and pallid countenance.

Before the recurrence of the next monthly period she has perhaps recovered her wonted health; but the same series of symptoms returns, perhaps with some aggravation, particularly with a longer continuance of the discharge. In this manner, one period has scarcely terminated before another commences, and the most strong and plethoric woman is brought down to a state of great weakness, and the disposition to hæmorrhage continuing, active menorrhagia may thus lapse into passive hæmorrhage.

In passive menorrhagia the female is usually delicate, with feeble constitutional powers, or has become so from repeated losses of blood in the more active form of the disease. She has a frequent circulation; the heart is easily excited to overaction; she suffers from violent headachs, with throbbing of the temporal arteries, singing in the ears, and giddiness, symptoms arising not from general plethora but from exhaustion and unequal distribution of blood. In passive menorrhagia there are seldom any premonitory symptoms; if the menstrual periods are still regular as to time, they are unnatural as to duration and the quantity of blood lost: they are generally, however, too frequent, and there is scarcely any cessation of the discharge. When the gushes of blood have stopped, they are succeeded by a constant oozing of a thin serous fluid; and when the catamenia have ceased, a profuse leucorrhœal discharge takes place: slight bodily exertion or mental excitement brings on a return of the sanguineous discharge. The usual constitutional effects of repeated loss of blood are at last induced, and the person exhibits the well-known appearance of confirmed anæmia. The danger of passive menorrhagia is not merely confined to the serious constitutional effects just adverted to; the discharge may be so sudden and profuse as to bring on alarming syncope. Another evil consequence of continued menorrhagia has been remarked in the tendency of such women to profuse losses of blood after abortion or parturition at the full time. Females who are naturally plethoric are disposed to active menorrhagia; in such cases it is often a natural mode of relieving the over-distended vessels: this tendency is aggravated by luxurious habits, a sedentary and indolent life, and inattention to the regular and free action of the bowels. All those causes which tend to lower the constitutional powers dispose to passive menorrhagia; but there certainly are delicate females in whom from early life there seems to be a superabundant or undue distribution of blood to the uterus, and who, under the influence of certain exciting causes, are almost sure to suffer from passive menorrhagia.

The principal exciting causes which peculiarly tend to increase the activity of the circulation through the uterine system, and thus bring on menorrhagia, are violent exertion or fatigue in the erect posture, just prior to the appearance of the catamenia; blows, falls, or any other local violence; frequent abortions; over-indulgence in sexual intercourse, particularly before the period has entirely passed over; irritation in the rectum or bladder, &c. The treatment of menorrhagia must mainly depend upon the nature of the hæmorrhage, and the exciting causes which have brought on the discharge.

Where the menorrhagia still bears an active character in a robust and plethoric female, we may abstract a moderate quantity of blood by venesection; and in those cases which are accompanied by much pain in the loins and pelvis, great relief will be obtained by the abstraction of six or eight ounces of blood by cupping from the sacrum. The patient should be kept at perfect rest in the horizontal posture, the body covered with light clothing, and cold applied to the lower parts of the body; cold water may be dashed from time to time over the hypogastrium or loins, and ice-cold applications laid over the pubes and perineum.

When the discharge is so excessive that much additional loss of blood might be attended with danger, we may resort to a very effectual method of restraining the hæmorrhage, viz. plugging the vagina, according to the directions of Dr. Locock in his paper on menorrhagia: — "A fine cambric handkerchief may be gradually introduced into the vagina up to the os uteri, so as to fill the vagina

firmly throughout its whole extent, and be allowed to remain there. Many prefer soaking it previously in some strong astringent liquid, and this is perhaps still more efficacious. If the plug produce pain, it must be withdrawn; and, at all events, it should not be allowed to remain more than twenty-four hours. On withdrawing it, unless it be done very gently and gradually, a fresh discharge of blood is apt to be occasioned; but it can easily be restrained by another plug, or some of the other remedies." (*Cyc. Pract. Med.*) Of the internal remedies for restraining uterine hæmorrhage when it is excessive and of the active kind, we have nothing further to suggest than those which have been recommended in all active constitutional hæmorrhages.

In passive menorrhagia occurring in feeble constitutions, or in those reduced by a long continuance of the disease in an active form, besides the topical remedies for the actual repression of the hæmorrhage, we must endeavour, in the intervals between the periods, to restore tone to the vessels of the uterus; and to strengthen the general health. To accomplish the former object, cold bathing, the cold hip bath, and sponging the body with cold vinegar and water, will be found of great use. These should be employed daily, and a cold astringent injection may be thrown up into the vagina every morning.

The various mineral tonics and astringents, judiciously administered, will be found eminently serviceable in cases of passive menorrhagia. The salts of iron and zinc are those upon which most reliance may be placed, and the former are particularly efficacious, when taken in the minute quantities in which they are found in many natural mineral springs. Dr. Locock has also found the Liq. Potass. Arsenitis, in doses of five drops, gradually increased to twenty-five, of great service in some cases of menorrhagia of the atonic character. The other rules for the improvement of general health will be the same in this as in other forms of passive hæmorrhage.

Uterine hæmorrhage may occur during pregnancy: this accident may happen in the early or in the more advanced stage of utero-gestation. When uterine hæmorrhage occurs at the early period of pregnancy, it is occasioned by the partial separation of the placenta from the uterus, and the probability of arresting the hæmorrhage and preventing abortion will depend upon the extent to which the detachment of the placenta has proceeded. The further practical consideration of this variety of uterine hæmorrhage will be more conveniently entered upon, where the causes and treatment of abortion are discussed. When uterine hæmorrhage does not make its appearance until the fifth month of pregnancy, it is usually a much more formidable accident, and commonly arises from malposition of the placenta near the mouth of the uterus. It appears without any obvious cause, and subsides after some precautions have been adopted, but again appears more profusely, continues longer, and does not yield to the former treatment. This variety of uterine hæmorrhage generally goes on increasing until the fœtus dies, or premature delivery is accomplished. The quantities of blood lost are sometimes so considerable as to endanger the life of the mother; or, if she escape with her life, she is reduced to a state of complete anæmia, and is harassed with the distressing train of symptoms with which it is accompanied.

The various means to be resorted to for controlling this form of uterine hæmorrhage, and the indications which should induce the practitioner to bring on premature delivery, are more appropriately considered in treatises on midwifery.

When such an amount of blood is lost during parturition as to entitle it to be called a hæmorrhage, it may occur either at the commencement or at the termination of that process. When the hæmorrhage comes on at an early stage of labour, it is usually from the attachment of the placenta near the mouth of the uterus, or from its partial separation from unequal contractions of the uterus. In rarer cases it may proceed from laceration of some part of the substance of the uterus, or from rupture of the umbilical cord. When the hæmorrhage comes on towards the termination of labour, after the expulsion of the fœtus, it appears to arise either from imperfect separation of the pla-

centa, connected with irregular or spasmodic contraction of the uterus, or from torpidity and imperfect contraction of the womb after the expulsion of the placenta. If uterine hæmorrhage occur at the termination of labour from either of the above-mentioned causes, the blood may either escape through the vagina or remain confined within the uterus. The former is readily indicated by the profuse flooding, but the latter may not be detected until the woman is falling into fatal syncope, when the uterus is found distended almost to the size it was before delivery. It is obvious that this internal hæmorrhage is of a most formidable nature, from the insidious manner in which it goes on to an almost fatal extent. We shall content ourselves with having pointed out these varieties of uterine hæmorrhage, and the causes which apparently give rise to them, referring for more ample details, and the requisite treatment, to treatises on midwifery.

The last form of uterine hæmorrhage which we propose to consider is that which is independent of menstruation, pregnancy, or parturition, and which may be properly termed *symptomatic*, arising from some structural disease in the uterus itself.

Hæmorrhage from the uterus sometimes occurs as a critical evacuation in the course of uterine inflammation, but the most frequent morbid condition of the uterus, which gives rise to repeated attacks of hæmorrhage, is the development of some morbid growth within its cavity. These formations are tumours of various kinds, either in the muscular walls of the organ, or immediately beneath the internal lining; polypous growths, moles, carcinoma, and destructive ulcerations.

The presence of any of the above-described morbid formations in the uterus has a tendency to excite undue activity in the circulation of the organ. If they form during that period of life when the woman should menstruate, their existence may perhaps be indicated by no other symptoms than profuse and painful menstruation, followed by occasional leucorrhœa. Many of the most severe and obstinate cases of menorrhagia are dependent upon some fibrous tumour or polypous growth in the uterus, and such cases progress from bad to worse, unless the exciting cause is detected. The only permanent cure for interior hæmorrhage of this kind is by surgical operation.

Uterine hæmorrhage sometimes comes on and continues for a short time after the cessation of the catamenia. When this appears only once or twice, it readily yields to remedies which diminish plethora and equalise the circulation; but when uterine hæmorrhage occurs to any extent after the cessation of the catamenia, and recurs from time to time, particularly if the woman is approaching her fiftieth year, there is just cause of alarm that this hæmorrhage is symptomatic of serious structural disease of the uterus.

It is the opinion of Louis and some able pathologists, that hæmorrhage from the uterus and other organs is one of the most constant symptoms of malignant formations. The frequent recurrence of uterine hæmorrhage in a woman of middle age should at once excite the suspicion of structural disease in that organ, and induce the practitioner to institute a careful manual examination of its condition. Women themselves are sometimes apt to imagine, that the discharge of blood is only a return of the catamenia; but symptomatic hæmorrhage may be distinguished from the catamenial by the character of the discharge, by the irregularity of the periods, by its longer continuance, and by the succession of leucorrhœa to the bloody fluid.

Although this form of hæmorrhage is only a symptom of structural disease, still it often requires more serious attention for the time than the disease on which it depends. Its frequent recurrence and the consequent anæmia demand immediate relief. For this purpose the various remedies suggested to control the different forms of menorrhagia will be applicable, but the only permanent relief to be anticipated must be through a judicious treatment of the structural disease of the uterus.

SCURVY.

Historical details. — Causes. — Prevention. — Symptoms. — Anatomical characters. — Diagnosis. — Treatment.

THE English word *scurvy*, anciently *scorbie*, is of Saxon origin, and evidently derived from the same root as the vernacular names of the disease among the other nations of the Saxon race ; namely, in the German language *scharbock*, which signifies a griping, or tearing of the belly ; in the Dutch *scheurbuik ;* in the Swedish *skörbjugg ;* and in the Danish *skörbug.* The medical term *scorbutus* appears to be merely a latinised variation of the last of these.

This disease was endemic two centuries ago, in all the northern countries of Europe. It became gradually less frequent as agriculture and gardening improved ; and we have witnessed the almost complete extinction of scurvy *on land*, as the influence of these arts has extended to the most remote parts of Europe and to the humblest classes. It seems to have been very imperfectly, if at all known to the Greek, Roman, and Arabian physicians. Some passages in the writings of Hippocrates have, indeed, led to the supposition that he was acquainted with this disease ; but those passages, if they refer to scurvy, are extremely vague, and show, at least, that his acquaintance with it was very slight, and that he had not learned to distinguish it from other diseases of different nature.

The Greek and Roman physicians, subsequent to Hippocrates, either copy his descriptions, or make no mention of any group of symptoms that can be supposed to refer to scurvy. It is probable, indeed, that they seldom met with instances of it, which must have been very rare among them, on account of the abundance of fruits and vegetables in their climate, and the shortness of their coasting voyages ; a circumstance unfavourable to its occurrence at sea. They were also little acquainted with the northern countries, where it must then, as since, have prevailed.

The earliest unequivocal description of scurvy is to be found in the narrative of the campaign of the Christian army in Egypt under Louis IX., about the year 1260. The historian of that crusade was not only eye-witness of the disease in others, but was himself affected with it. He speaks of the debility and tendency to swoon, black spots on the legs, bleedings from the nose, and the livid and spongy condition of the gums. With respect to the last-mentioned symptom, he says, " The barbers were forced to cut away very large pieces of flesh from the gums, to enable their patients to eat. It was pitiful to hear the cries and groans of those on whom this operation was performing ; they seemed like the cries of women in labour." The disease showed itself in Lent, during which the soldiers, in compliance with the ordinances of their religion, ate no meat, and they had only one sort of fish, the *bombette ;* this circumstance, together with bad air and great scarcity of water, was supposed to have brought on the disease. (*Histoire de Louis IX. par le Sieur Joinville, Trans.* vol. i. p. 162.)

Scurvy has, unquestionably, existed in the north of Europe from the most remote antiquity. That we have no mention of it in the early history of the northern nations must be imputed to the extreme ignorance of the people, especially as regards medicine ; but about the commencement of the sixteenth century, when they began to cultivate letters, we find accurate descriptions of this disease, which is frequently mentioned by their historians and other authors. Olaus Magnus, in his history of the northern nations, published in 1555, when speaking of the diseases peculiar to those nations, gives a particular description of scurvy, which, he tells us, infested chiefly soldiers in camps and persons shut up in prisons or besieged towns. About the same time we find three physicians, Roussens, Ecthius, and Wierus, expressly treating of this disease. Their descriptions of its symptoms are very accurate, and they recommended those remedies which are found, at present, the most efficacious.

In 1645 the Faculty of Medicine at Copenhagen, in Denmark, published a

consilium for the benefit of the poor in that country. This *consilium* treats of the causes, prevention, and cure of scurvy. We learn from it that scurvy was at that time prevalent among the Danes and other northern nations. (*Consilium Medicæ Facultatis Hafniensis de Scorbuto.* Lind, p. 353.)

It appears by a letter from Linnæus to Dr. Lind, dated 1755, that scurvy was, at that time, common on the borders of the Baltic among peasants, artificers in iron, and miners. (*Lind*, p. 283.) It was prevalent also in several parts of Scotland, where it was popularly known by the name of *black legs.* Dr. Grainger, in answer to some inquiries by Dr. Lind, says that it has often been very epidemic and fatal to the miners at Strontian, in Argyleshire.

Dr. Huxham, in a letter to Dr. Lind, says that scurvy was at that time endemic in some seaport towns of Devonshire and Cornwall. He remarks that it was most common in fishermen and tradesmen, and seldom met with in agricultural labourers, who drink cyder and eat plentifully of vegetables and fruits.

All the writers from whom the preceding accounts are derived, agree in stating that the latter part of winter and the early part of spring was the season in which scurvy prevailed most; and that it uniformly disappeared during summer and autumn.

The causes which, in the middle of last century had rendered scurvy less frequent on land than previously, have continued to operate with increasing efficiency; so that at present, except under peculiar circumstances, the disease is never met with in England, and, we believe, very rarely in any of the northern countries of Europe. That it should, a century or two ago, have been endemic in many parts of England seems almost incredible, when we consider the circumstances under which it arises, and the present aspect of this country; but we have undeniable evidence of the fact, and it affords proof of the extraordinary change which a few centuries have wrought in the cultivation of the soil, and in the habits of the people, especially with reference to the increased consumption of vegetable food. This is confirmed by the historical fact that, until the commencement of the sixteenth century, no salads, carrots, turnips, or other edible roots were grown in England. The little of these vegetables that was used before that time was imported from Holland and Flanders; and in the reign of Henry VIII. Queen Catherine, when she wanted a salad, was obliged to despatch a messenger thither on purpose.*

But although, two centuries ago, scurvy was endemic in the northern countries of Europe during the spring of every year, it was in seasons of scarcity, or when its usual causes were strengthened by the desolation of war, and during long sieges, that its ravages were principally felt.

During the siege of Breda, in North Brabant, by the Spaniards, in 1625, the inhabitants and garrison were dreadfully afflicted with scurvy; on the 16th of March, when an account was taken of the sick, 1608 soldiers were found affected with this disease; and the number afterwards increased daily. The town was surrendered in June, after a siege of eight months. (*Frederic Vander Mye, De Morbis Bredanis.*)

J. F. Backstrom, in an essay, published in 1734, which is replete with just observations on the causes, nature, and treatment of scurvy, informs us that, in 1703, during the siege of Thorn, in Prussia, by the Swedes, which lasted only five months, and was carried on during the heat of summer, 5000 of the garrison, besides a great number of the inhabitants, died of this distemper. The besiegers were, at the same time, quite free from it. (*Haller, Disput. ad Morbos*, vi.)

In 1720, during the war between the Austrians and Turks, when the imperial army wintered in Hungary, many thousands of the common soldiers, (but not one officer,) were cut off by scurvy. Dr. Kramer, physician to the army, being unacquainted with a remedy for it, requested a consultation of the college of physicians at Vienna. Their prescriptions and advice were, however,

* Hume, *Hist. of England*, vol. iv. p. 241.; see also, art. GOUT, in this work.

of no avail: the disease, which broke out at the end of winter, persisted until, at the approach of summer, the earth became covered with greens and vegetables. (*Haller, Disput. ad Morbos*, vi.)

In the early part of last century scurvy was also very common, and very fatal in the Russian armies. (*A Treatise on Scurvy, as it appeared in the Russian Armies*: by A. Nitzch, 1747. See *Lind*, p. 415.).

In the spring of 1760, scurvy prevailed to a great extent among the English troops that formed the garrison at Quebec, which had been taken from the French the preceding year. These troops, at first 6000 men, suffered so much from cold and want of vegetables and fresh provisions, that before the end of April, 1000 of them were dead of scurvy and twice that number unfit for service. (*Smollett's Hist. of Eng.*, vol. v. p. 198.)

But instances of armies being much weakened by scurvy, have occurred more recently, and among a people, who, by reason of their climate, which is favourable to the growth of vegetables and fruits, have enjoyed comparative immunity from that disease. In the spring of 1795, scurvy was very general among the French soldiers in the army of the Alps. Fodéré, who was physician to the army, informs us that he treated between seven and eight hundred soldiers affected with it. In 1801, during the siege of Alexandria, it prevailed among the inhabitants and garrison, to a most frightful extent. During the siege which was commenced by the English in May, and which lasted only till the end of August, 3500 scorbutic patients were received into the military hospitals, which the French had established in that city. (*Mém. de Chir. Milit. de D. J. Larrey*, Paris, 1812. tom. ii.)

In late years, scurvy has shown itself occasionally in our armies in India, as well as in some public establishments in that country*; and in the autumn of 1836, it prevailed to great extent among our troops, stationed in the new province of Queen Adelaide, at the Cape of Good Hope. The disease first appeared about the end of July, and continued to prevail from that time to December, a season corresponding to spring in the northern hemisphere. None of the officers were affected with it. The men had no harassing duties, and were abundantly supplied with good fresh meat, without having had an ounce of salt provisions; but they had been a long time without fruit or fresh vegetables. In all these circumstances, we find perfect agreement with some accounts left us of the occurrence of scurvy in the continental armies in the early part of last century.†

But it is not only in armies and during sieges, that we meet with even modern instances of the occurrence of scurvy on land. From the earliest times, it has appeared occasionally in persons long confined in prisons and asylums; and an instance of its prevailing extensively, under such circumstances, happened in England so recently as in the year 1823. We allude to the disease which prevailed in the spring of that year among the inmates of the Milbank Penitentiary. The description of this disease, by Dr. Latham, shows that it was scurvy in conjunction with dysentery and other effects of starvation. This complicated malady was occasioned by a diet, of which fresh succulent vegetables formed no part, and the quantity and quality of which were not adequate to the support of health.‡

The reports of the inspectors of prisons, for the years 1836, 1837, 1838, abound with instances of the occurrence of scurvy in our gaols and prisons. In 1836 it assumed a very malignant form in the county gaol at Norwich; not fewer than eighteen persons were severely affected with it. (*First Report of Inspectors of Prisons; Northern Division*, p. 39.) In the House of Correction at Swaffham, as appears from the statement of the surgeon, the

* Med. and Phys. Trans. of Calcutta, vols. iii. iv. vii. and viii.; and the Quarterly Journal of the Med. and Phys. Society of Calcutta, vol. i. p. 306.

† See Med. Gazette, vol. xx. Extract from the annual report of Dr. Murray, principal medical officer at the Cape of Good Hope.

‡ Scurvy showed itself in some of the prisoners soon after Christmas, and became very general in the month of February. The winter was very severe.

prisoners frequently lose their teeth from the effects of scurvy; and when they were examined (1836) in presence of the inspector, sixteen were found presenting its early symptoms.* (*Ibid.* p. 49.)

In most of the instances mentioned in these reports, it appeared in prisoners who had been some months in confinement; and originated in a circumstance already specified, namely, prolonged use of a diet of which fresh succulent vegetables formed no part.

We have said that notices of scurvy, as a disease peculiar to the northern nations of Europe, became frequent as soon as they began to cultivate letters; but two other circumstances, which happened about the same time, tended powerfully to direct men's minds to the consideration of this disease, and, by exhibiting it in an isolated manner, to give them precise ideas respecting it. We allude to the frequent performance of long voyages at sea, and to the establishment of colonies in the northern part of the newly-discovered continent of America.

The early northern colonies in America were dreadfully afflicted with scurvy. The French, especially upon first planting Canada, experienced such loss from the mortality it occasioned in winter, that they often had thoughts of abandoning their settlement. The same was the case with the English, on their settling in Newfoundland. The adventurers, who first wintered in Hudson's Bay, were almost all destroyed by scurvy; and, after many unsuccessful trials, it was deemed impracticable to pass the winter in those parts.

As early as the middle of last century, however, the persons employed in our factories at Hudson's Bay, enjoyed extraordinary health, and were entirely exempt from scurvy; a circumstance which has been ascribed to the use of spruce beer, which they had adopted as a common beverage.

But it is during long voyages that the ravages of scurvy have been most felt, and the existence of it, as a prevalent disease, maintained.

The earliest account of the occurrence of scurvy at sea is to be met with in the narrative of Vasco de Gama, who first discovered a passage to the East Indies by the Cape of Good Hope, in the year 1497; about a hundred of his men, out of a hundred and sixty, died of this distemper.†

The narratives of subsequent navigators, especially Cartier, Drake, Cavendish, and Dampier, abound with descriptions of the frightful ravages of scurvy. In the account of the second voyage of Cartier to Newfoundland, in 1535‡, there is a very graphic description of the disease, which showed itself in his men soon after Christmas, and which he ascribed to their intercourse with the natives who were at that time affected with it. The following passage will give some idea of the sufferings it occasioned:— "With such infection did the sickness spread in our three ships, that about the middle of February, of a hundred and ten persons that we were, there were not ten whole; so that one could not help the other; a most horrible and pitiful case. Eight were already dead, and more than fifty sick, and, as we thought, past all hope of recovery. This malady being unknown to us, the body of one of our men was opened, to see if by any means possible the occasion of it might be discovered, and the rest of us preserved. But in such sort did the sickness continue and increase, that by the middle of March there were not above three sound men left. Twenty-five of our best men had died, and all the rest were so ill that we thought they would never recover again; when it pleased God to cast his pitiful eye upon us, and send us knowledge of a remedy for our health and recovery." (*Hakluyt's Collection of Voyages*, vol. iii.)

The remedy alluded to was a decoction of the bark and leaves of a tree,

* For other instances, see First Report, 1836, No. 2. p. 55. 60. 63. 85, &c; Second Report, 1837, No. 1. p. 81. 217. 232, &c.; Third Report, 1838, No. 2. p. 71., No. 3. p. 79, &c.

† V. de Gama sailed on the 8th of July, 1497, and returned to Lisbon in the month of September 1499, more than two years after his departure.

‡ Cartier sailed from St. Malo on the 19th of May, 1535, and arrived at Newfoundland on the 7th of July. He spent the autumn in exploring the coast and the river St. Lawrence, which was discovered by him.

called by the natives, *Ameda*, or *Hanneda*, by the use of which they were all perfectly restored in a short time.

In the first voyage for the establishment of the East India Company, the equipment, consisting of four ships with 480 men, under commodore Lancaster, sailed from England on the 2d of April, 1600. The crews of three of these ships were so weakened by scurvy, by the time they had got only three degrees beyond the line, that the merchants who had embarked on this adventure, were obliged to do duty as common sailors. On the 1st of August, when they arrived at Saldanha, near the Cape of Good Hope, the commodore's own ship was in perfect health, from his having given three table-spoonsful of lemon juice every morning to each of his men; while the other ships were so sickly that the commodore was obliged to send men on board to take in their sails and hoist out their boats; and there died, at sea and on shore at Saldanha, 105 men, nearly one fourth of their whole number. (*Purchas's Collection of Voyages*, vol. i.)

The memorable expedition of Lord Anson in 1740, and the four following years*, offers another example of the mortality formerly occasioned by scurvy during long voyages. At the end of two years from their leaving England, the vessels engaged in the expedition had lost, from this disease, a larger proportion than four in five of the original number of their crews.

It is gratifying to turn from the descriptions of sufferings undergone in the voyages of earlier navigators, to the narrative of Captain Cook, who in 1772, 3, 4, and 5†, in the *Resolution*, with a company of 118 men, performed a voyage of three years and eighteen days, in all climates, from 52° north to 71° south, with the loss of only one of his crew by disease.

It is to the sagacity of this extraordinary man that we are indebted for the first impulse towards those improvements in the treatment of sailors by which scurvy is at present so effectually prevented in our navy.

In 1780 scurvy was very prevalent in the Channel fleet. In the month of August the squadron under Admiral Geary, after a cruise of ten weeks in the Bay of Biscay, returned to Portsmouth with 2400 men affected with it. During the same year and the following, scurvy prevailed also to great extent in our fleet, under Lord Rodney, in the West Indies; it was, however, much mitigated by improvements which were then introduced, chiefly at the suggestion of Sir Gilbert Blane, into the victualling of the fleet. From this time scurvy was much less prevalent than before, but in the spring of 1795 it broke out in the Channel fleet under the command of Lord Howe, to such an extent as to endanger the safety of the whole fleet. Its uncommon violence was owing to the following circumstances. The winter had been extremely severe, and all vegetation was destroyed in the neighbourhood of Portsmouth, so that no vegetables could be procured, or they could be procured only at a price which put them out of reach of the sailor; beef, too, had much risen in price, and the Victualling Board had, in consequence, allowed fresh meat only one day a week. In the beginning of April, scurvy made its appearance, and soon after pervaded every ship. To suppress it, became, of course, an object of great national importance, and every effort was made by the commissioners of the Admiralty for the accomplishment of this purpose. Fresh meat, together with a plentiful supply of oranges and lemons, was granted. Vegetables at first could be procured only in small quantities; as the season advanced, they became more plentiful, and after the 31st of May, 5000 weight of salad was distributed daily among the ships at Spithead. The good effects of these refreshments were astonishing; on the 12th of June the squadron sailed again in good health. (See an admirable account of the health of the fleet in *Trotter's Medicina Nautica.*)

It was in the course of this year that an admiralty order was first given for furnishing the navy with a regular supply of lemon juice, which had been long known to be a remedy for scurvy, and which some recent experiments had

* Lord Anson left England in September, 1740, and returned in June, 1744

† Captain Cook sailed from Plymouth on the 13th of July, 1772.

proved to be equally efficacious in preventing it. From this time we may date the extinction of scurvy in the British navy. It has, indeed, shown itself on several occasions since, especially in some of the expeditions for the discovery of a north-west passage; but it has prevailed only in a slight degree, and has almost always been suppressed by an additional allowance of lemon juice.

This happy result is far, however, from being realised in the commercial marine of this country. The means, which experience has proved to be of such certain efficacy, and which are so easy of adoption, are in many instances neglected: in proof of this we need only mention, that in the space of a year and a half, during which we have been physician to the Seamens' Hospital, Dreadnought, we have had to treat nearly fifty cases of scurvy; and from information obtained from these patients, are led to estimate the number of sailors, who entered the port of London, affected with scurvy during this period, at not less than double that number. The wretched condition of some of these men has convinced us that the descriptions of the sufferings occasioned by scurvy in voyages of the early navigators have not been exaggerated.

All the cases that have fallen under our observation, with the exception of four, occurred in sailors who had come from the Mauritius, Sidney, Ceylon, China, or some port in India; of these four, two happened in the spring of the present year (1838), in Russian sailors belonging to different vessels, each of which had been several months in the Thames *; one, in a sailor who came last from the West Indies; and the fourth, in a sailor recently arrived from the coast of Spain.

We have no data for forming an accurate estimate of the mortality occasioned by scurvy before preventive measures were generally adopted. It has been supposed, however, to have destroyed more sailors than the other various accidents incidental to a sea-life, together with the terrific consequences of naval warfare; and history furnishes us with many examples, which tend to show that in this estimate the destructive effects of it have not been overrated.

Sir R. Hawkins, who lived in the latter part of the sixteenth century, and whose description of this disease shows that he was well acquainted with it, informs us that he could give an account of ten thousand mariners, consumed by scurvy alone, in twenty years that he had been at sea. †

Admiral Hosier, who set sail in the month of April, 1726, with seven ships of the line for the West Indies, buried his ships' companies twice, and died himself of a broken heart in consequence.

We are told by Dr. Lind that during the war, which terminated in 1748, in the peace of Aix-la-Chapelle, scurvy proved more destructive, and cut off a greater number of valuable lives than the united efforts of the French and Spanish arms. (*Lind*, preface, p. 5.)

But the most striking illustration of the dreadful effects of scurvy in former times is the contrast, in point of health, which our present navy offers with the fleets of this country before effectual remedies were resorted to. The mortality in the navy had been gradually decreasing since 1780, when various improvements were made in the victualling of the fleet and in the general treatment of the men; but in 1795, when a regular supply of lemon juice was first granted, the mortality fell *suddenly*, and to a degree scarcely credible.

* One of these men was admitted on the 2d, the other on the 15th of March. The winter had been uncommonly severe. The diet of one of them consisted of black rye bread and Russian butter, with tea, mornings and evenings; and for dinner, one pound of salt beef, with boiled pearl barley, two days; one pound of Russian pork, with peasoup, three days a week; dry stock fish, with flour pudding on Saturdays; one pound of fresh meat, with barley soup, on Sundays. A small glass of brandy daily, but no beer or vinegar. The diet of the other had been nearly the same: in fact, this is the general diet of Russian sailors in merchant ships; the only variation being in the relative number of beef and pork days. On referring to the registers of the *Dreadnought* for former years, I find other instances of Russian sailors, engaged in the trade between Russia and this country, admitted for scurvy during the spring months.

† Observations of Sir R. Hawkins, Knt., in his Voyage to the South Sea, A.D. 1593. (*Purchas's Pilgrim*, vol. iv.)

The effect of all these salutary measures may be estimated by the fact mentioned by Sir J. Barrow, that between the years 1779 and 1813, the diminution of sick and of deaths in the British navy was in the proportion of four to one nearly. (See *Supplement to Encyc. Britan.* art. NAVY.)

Causes. In the preceding sketch of the history of scurvy we have found it difficult to avoid allusion to its causes, and to the means by which it may be prevented. The following observations must be considered, therefore, as the complement of what we have already said in reference to these subjects.

Salt provisions. In consequence of the frequent occurrence of scurvy at sea, and on shore, in persons whose diet, like that of sailors, consisted chiefly of salt meat, it was at one time supposed to be occasioned by excessive use of salt. A more extended view of the circumstances under which scurvy arises, is sufficient to show that this opinion is erroneous.

Kramer, in the letter we have already quoted, informs us that the Germans, among whom scurvy occasioned such great mortality in the spring of 1720, in Hungary, ate no salt beef or pork, but, on the contrary, had plenty of fresh meat at a very low price.

The soldiers in the Russian armies, who, in the early part of last century suffered greatly from scurvy, had also no salt provisions. We have already remarked that the same was the case with our regiments at the Cape, in which scurvy prevailed in the autumn of 1836.

In the middle of last century, when Sisinghurst Castle in Kent was filled with French prisoners, scurvy broke out among them, although from the time of their arrival in England, they had eaten no salt provisions, but had been served daily with fresh meat and bread, but without greens or other vegetables.*

The severity of the winter of 1794-5, which we have already mentioned as the cause of the unusual prevalence of scurvy in the Channel fleet in the following spring, was also productive of scurvy on shore. During that spring cases of genuine scurvy were admitted into most of the London Hospitals; and Dr. Heberden has well described those of some patients that were under his own care in St. George's. Speaking of one of these patients, he says, "His diet previously to the occurrence of scurvy, consisted of bread and butter, with tea for breakfast, fresh meat and bread for dinner, and water-gruel for supper. This was his common food at all times, excepting that he had been used to eat vegetables, which, on account of their high price, he had not been able to procure for some months." (*Med. Trans.*, vol. iv.)

From a paper published in the *Trans. of Med. and Phys. Soc. of Calcutta*, vol. iv., it appears that in the lunatic asylum at Moorshedabad, in that presidency, one third of the inmates are annually affected with scurvy, which shows itself during the rainy and cold season, and disappears in the hot season. The diet of the inmates consists of rice, split peas, curdled milk, oil, salt, pepper, water; all good of their kind, and in sufficient quantity. In addition to this, a small quantity of tobacco is allowed them. Cakes, made of the flour of wheat, are occasionally substituted for rice; and fresh fish, and sometimes animal food, is given to those, who wish for a change of diet. It is remarked that no cases of scurvy have ever occurred in the jail, which is only about three hundred yards distant from the asylum, and in which the diet is in no respect better.†

The preceding instances are sufficient to show, that scurvy may arise independently of the use of salt provisions; there are other facts which lead to the conviction, that salt has no influence whatever in producing it.

It was remarked by Dr. Lind, who had the merit of first showing the error of the opinion in question, that few workmen in any business are so healthy as those engaged in the preparation of sea-salt; and that the persons who work

* Address to the Royal Society, by Sir J. Pringle, 1776-7.

† Med. and Phys. Trans. of Calcutta, vol. iv. p. 16. Land Scurvy among the Natives, by B. Burt, M.D.

night and day in the salt mines in Poland, and even live in them, are not at all subject to scurvy; but, on the contrary, remarkable for health and the vigour of their constitutions. (*Lind*, p. 51.)

Salt water, even in persons who have continued the use of it a long time, has never been known to bring on scurvy; and when given to scorbutic patients,—an experiment often tried,—it has in no instance been found to aggravate the disease. (*Lind*, p. 51., *Blane*, *Dis. of Seamen*, p. 296.)

Another circumstance of great moment in reference to this question, is the readiness with which scurvy may be cured by lemon juice, even while the patients continue to subsist on salt provisions. The history of modern navigation abounds with instances which establish this fact.

The circumstances we have adduced, showing that scurvy may prevail to a frightful extent among persons living solely on fresh meat; that persons who, from the nature of their occupations, are continually absorbing saline particles, are exempt from scurvy; that scurvy is not brought on by the use of sea water, which may be drunk with impunity, even by scorbutic people; and that the disease may be prevented for any length of time, in persons who subsist on salt provisions, and can be readily cured even in those who continue the use of them;—are sufficient to justify the conclusion, that salt has no share whatever in producing it.

The frequency of scurvy during long voyages led also to the supposition, that sea-air, or some unknown marine agency, had an especial influence in causing it. At present, this opinion scarcely needs refutation. Modern experience has amply proved, not only the harmlessness, but the extraordinary salubrity of sea-air. The fact, that it exerts no particular influence in producing scurvy, was, however, first established by Captain Cook, who, as we have before observed, performed with a company of 110 men, a voyage of more than three years with the loss of only one man by disease.

Impure air. It has been supposed, too, that the air of ships, impure from defective ventilation and want of cleanliness, has had some share in bringing on scurvy. But there is reason to believe that this opinion is as unfounded as those we have already discussed. Scurvy is, at present, never met with in the most crowded and filthy parts of this metropolis, where, from the operation of the causes in question, fever almost always prevails. It was remarked by Dr. Lind that ship carpenters, though more exposed to the foul air of the hold, were not more subject to scurvy than the rest of the crew. Nor does attention to cleanliness and ventilation, when the causes of scurvy continue to operate, seem to have much influence in mitigating its severity. The writer of Lord Anson's voyage informs us that, during the latter part of their run, before their arrival at the island of Tinian, all the ports were kept open, and uncommon pains taken in sweetening and cleansing the ship, without producing any abatement in the progress or the virulence of the disease.

Dr. Trotter, in his account of the health of the Channel fleet in 1795, says, "To have thought of foul air as a cause of scurvy when it appeared in the *Royal George* and *Queen*, would have been the last resource of a physician investigating causes, who had witnessed the admirable system of duty practised by Captains Domet and Bedford." (*Med. Naut.*, vol. i. p. 427.)

Another circumstance, which powerfully supports the opinion that the causes in question have no share in producing the disease, is the readiness with which scorbutic patients may be cured while they continue to reside on board. We have ample testimony in the writings of Sir Gilbert Blane and other naval physicians, that these patients recovered quite as rapidly on board their ships as in hospitals on shore. (*Diseases of Seamen*, p. 59.; *Med. Nautica*, vol. i. p. 426.)

Cold; moisture. The fact that scurvy, when it first attracted attention, prevailed exclusively in northern countries, early led to the opinion that cold and moisture had considerable share in causing it; and this opinion has been maintained up to the present time by the highest authorities on this subject. Dr. Lind tells us, that Channel cruisers were often quickly overrun with scurvy, while

their consorts, fitted out at the same port, and consequently with provisions and water of like quality, who soon after left them for a much longer cruise off the Canaries, or Cadiz, or a voyage to the Indies, kept pretty free from it; and that it always appeared in much shorter time, and raged with greater violence in a squadron cruising in the narrow seas of the Baltic and Channel, or upon the coast of Norway, or Hudson's Bay, than in another continuing the same length of time in the middle of the Atlantic ocean. (*Lind*, p. 63.)

Sir G. Blane expresses the same opinion, which seems, however, to have been refuted by his own experience while physician to the fleet in the West Indies.

An attentive consideration of the history of scurvy has convinced us, that the influence of these causes has been much over-rated, and that the comparative immunity from this disease formerly enjoyed by fleets in warm latitudes was mainly owing to supplies of oranges and other fruits with which Cadiz, Madeira, or the islands of the West Indies furnished them.

We have already given instances * of the occurrence of scurvy in the highest degree during the months of summer, and in tropical climates; so that no temperature is a preservative from this malady; nor does change from a cold to a warm climate, when scurvy exists, seem in any degree to lessen its severity. The writer of Lord Anson's voyage says, "Some of us were willing to believe that, in this warm climate, the violence of the disease, and its fatality, might be in some degree mitigated; but the havoc of the distemper in our present circumstances soon convinced us of the falsity of this speculation."

In confirmation of this testimony we may again mention that, at present, the merchant-seamen who enter the port of London, affected with scurvy, come, almost exclusively, from the Mauritius, India, Ceylon, or China; and have, consequently, been in no higher latitude than that of the Cape.

Another circumstance which shows that cold has not much influence in producing scurvy, is the readiness with which this disease can be prevented † or cured, even in the coldest countries. We have already noticed the entire exemption from scurvy enjoyed by the persons employed in our factories at Hudson's Bay; the same is the case in Greenland and Iceland. When the disease occurs in those climates it is quickly cured by lemon juice, or by sorrel or scurvy-grass, plants found in great abundance in the polar regions during the summer months.

That moisture alone is incapable of producing scurvy is evident from the example of Venice, and many insular positions, where the disease is never met with.

Contagion. Scurvy, like all diseases which have prevailed epidemically, was, at one time, supposed to be contagious; but the error of this opinion was early shown by the almost constant exemption of officers in armies and in ships. The same opinion has been advanced, however, in modern times, and by an author of considerable merit. In further confutation of it, we cannot do better than repeat the just remark of Dr. Lind, that "those authors should have given us attested histories of persons infected in this manner, where the other causes that always produce the disease had no influence. But no such histories are to be found." ‡

We have already seen that scurvy may occur in all climates, either on land, or at sea; in persons who subsist on salt meat or fresh; and in situations in which the utmost attention is paid to cleanliness and ventilation. There is one condition, however, which is necessary for the production of scurvy; namely,

* In the sieges of Thorn and Alexandria; and in the voyages of Commodore Lancaster, Admiral Hosier, Admiral Geary, &c.

† In the second polar expedition of Sir E. Parry, scurvy showed itself only after the crews had spent two successive winters in the polar seas and when they had been for twenty-seven months in entire dependence upon the resources contained within their ship, unassisted by any fresh antiscorbutic plants or other vegetables. In this expedition Sir E. Parry left the Nore, with the *Hecla* and *Fury* on the 8th of May, 1821; and reached the Shetland Islands on his return, on the 10th of October, 1823.

‡ Lind, p. 45. 146. Diseases of Seamen, p. 476. Fodéré, Dict. de Sc. Méd., art. Scorbut.

prolonged abstinence from succulent vegetables or fruits, or their preserved juices as an article of food. When this condition is fulfilled, we find scurvy arising in persons whose situations are the most various in every other respect in which we can compare them; while not a single instance can be cited of its occurring in a person well supplied with these vegetables or fruits. This circumstance, together with the fact that scurvy is, in all cases, rapidly cured when a supply of these vegetables or fruits is furnished, leads us to consider the abstinence in question as its essential and sole cause. We have said that this abstinence must be prolonged: it would seem, indeed, that in a person previously well supplied with vegetable juices, abstinence of from two to five months is necessary to produce the disease. On land, scurvy has shown itself always towards the end of winter or in spring; at sea, it has appeared after voyages of very different durations: in some cases, at the end of a month or six weeks; in others, after the lapse of five or six months. This difference depended on the time of year when the vessel left port, or rather on the previous diet of the men. Attention to this circumstance will serve to explain all the apparent anomalies which have forced writers on scurvy to have recourse to such a variety of causes.

Dr. Lind tells us that while he was surgeon of the *Salisbury*, in 1746 and 1747, scurvy raged with great violence in that ship, during two Channel cruises, one of ten weeks, the other of eleven; and that, in each of these cruises, it showed itself in less than six weeks after they put to sea; yet, at the end of a subsequent cruise of twelve weeks, which was the longest the *Salisbury* made, there was but one scorbutic person on board. Dr. Lind could assign no cause for this difference except the state of the weather. The real cause of it is undoubtedly to be found in the circumstance, that the two former cruises were made in the months of April, May, and June, so that the men left port in spring when scurvy was already imminent; while the last cruise was performed in the months of August, September, and October. (*Lind*, p. 56. 65.) The great mortality from scurvy in the ships under the command of Commodore Lancaster in 1600, was principally owing to his having commenced the voyage in spring. In this instance cold had evidently no share in producing the disease. The same was the case with the squadron sent to the West Indies under Admiral Hosier in 1726.

The history of our navy abounds with similar examples. (*Diseases of Seamen*, p. 102. 148.) We shall content ourselves with mentioning another instance which occurred in the Channel fleet in 1795, and which is illustrative of the same point. We have already stated that scurvy raged with extraordinary violence in the fleet in the spring of that year, and that it was suppressed by the abundant supply of lemons and salad furnished to the ships at Spithead in the latter part of May and the beginning of June. On the 10th of June the fleet again sailed, and scurvy soon made its appearance; but it was found from the list of patients that, during the cruise, which was a long one, not a man who had shared in the allowance at Spithead showed the slightest symptom of the disease. (*Med. Naut.*, vol. i. p. 423.)

It has been brought forward by writers on scurvy, as a strong argument in favour of the great influence which they ascribed to cold in the production of this malady, that the sailors most prone to it were those engaged in the northern whale fishery, although the vessels employed in this service were better fitted out than any others, with respect both to variety and quality of provisions; the voyage from this country short; and the men kept constantly in action. The fact has been unnoticed that these vessels always left this country in spring.

The great mortality occasioned by scurvy during the siege of Thorn, in 1703, admits of similar explanation. The siege, which lasted only five months, was carried on during the heat of summer. This circumstance, which rendered the mortality unaccountable to Bachstrom, Dr. Lind, and others, who believed that cold has great influence in causing this distemper, affords the true explanation of its unusual fatality. The siege was commenced in spring, when scurvy was

already imminent in the inhabitants: had the siege been undertaken at the end of summer, they would have suffered comparatively little from the disease. The history of the siege of Alexandria furnishes us with a precisely parallel instance. The fatal effects of scurvy have, in fact, been generally most felt during sieges commenced in spring, and in voyages entered on in spring from cold countries. The siege and the voyage have in these cases prolonged to the inhabitants and the sailors, not the cold indeed of winter, but abstinence from fresh vegetables, which, in former times, the cold of winter always occasioned.

Predisposing causes. When a number of persons are placed in circumstances conducive to scurvy, the first to exhibit its symptoms are those who, from sickness or other causes, are in a state of debility. *

In the Channel fleet, in the spring of 1795, scurvy appeared chiefly in those men who were convalescent from an epidemic catarrh (*Med. Naut.*, vol. i. p. 407.); and, during the siege of Alexandria, in 1801, those soldiers who had received severe injuries, or were reduced by the ophthalmia, which at that time prevailed among them, were the first to suffer from scurvy. (*Larrey, Chir. Milit.* t. ii p. 284.)

It has often been observed to affect in especial manner persons recovering from intermittent fevers (*Lind*, p. 210.); and our own experience furnishes us with several instances which tend to confirm that observation.

Age. Scurvy may occur in persons of all ages. Dr. Mertans, in a paper published in 1778, when he was physician to the Foundling Hospital at Moscow, informs us that scurvy showed itself every spring among the children in that establishment, and that one year as many as sixty of them were affected with it. (*Phil. Trans.*, vol. lxviii.)

We have obtained from the registers of the *Dreadnought* the ages of 200 scorbutic patients received into that hospital; and have arranged these so as to show how many of them were under 20, between 20 and 30, 30 and 40, and so on. These numbers we have compared, in the subjoined table, with the average numbers of merchant seamen whose ages are comprised within the same limits. The average numbers have been derived by taking from the registers at the Custom House, where the age of every sailor who comes into the port of London is registered, the ages of 5000 sailors, entered in succession, by arranging these so as to show the numbers whose ages are comprised within the limits in question; and by reducing these numbers to the scale of 200. †

Patients.	Age.					
	Under 20.	20—30.	30—40.	40—50.	50 and upwards.	Total.
No. of scorbutic patients - -	20	71	54	36	19	200
Average number of sailors - -	21·32	95·04	45·20	26·88	11·56	200

In this table, those in the first vertical column are almost all between the ages of 15 and 20; the second column (20—30.) includes all whose ages have 2 for the first figure; the third (30—40.) all whose ages have 3 for the first figure; and so on.

It appears from this table that persons between the ages of 20 and 30 are of all persons above the age of 15, the least liable to scurvy; and that above the age of 30, the proportion of scorbutic patients continually increases with age. We are inclined to believe that the predisposing influence of age is even

* Lind., p. 70. and 402.; Curtis's Diseases of India, p. 9.

† See art. CHOLERA.

greater than is indicated by the preceding table. The average numbers in this table are derived from the ages of sailors, taken indiscriminately; whereas scorbutic patients all come from distant ports. Sailors engaged in the merchant service may be arranged in two classes: the one comprising those employed in the home, the other those in the foreign trade. Now, sailors advanced in life frequently leave the latter service for the former; and the mortality among seamen is greater in hot climates than in our own; so that there is reason to believe that the proportion of sailors of an advanced age is less in those engaged in the foreign trade, than in those employed at home.

Indolent, lazy habits, and despondency, have often been mentioned as exerting a powerful predisposing influence in the production of scurvy; and instances may be cited which seem to show the reality of such an influence.

In ships that have contained marines as well as sailors, the marines have in general been more affected with scurvy than the sailors.*

The historian of Lord Anson's voyage tells us, that "whatever discouraged the people, or at any time damped their hopes, never failed to add new vigour to the distemper; so that it seemed as if alacrity of mind and sanguine thoughts were no contemptible preservatives from its fatal malignity."

It is probable, however, that the influence of these causes has been much overrated, and that listlessness and aversion to exercise, from being early and constant symptoms of the disease, have often been mistaken for its cause.

Preventives. We come now to speak more in detail of the means by which scurvy may be prevented; and shall first mention as the chief of these means, the use of oranges, lemons, or limes; and, we believe, we might add, shaddocks, and all fruits which botanists have included in the order *Aurantiaceæ.*

The efficacy of oranges in preventing and curing scurvy was discovered before the disease had been described by physicians. Rousseus, one of the earliest writers on scurvy, in a work published in 1564, observes that seamen in long voyages cure themselves of it by the use of oranges. He conjectures that Dutch sailors, afflicted with scurvy on their return from Spain with a cargo of these fruits, had by chance discovered their efficacy.

Albertus, in a treatise on Scurvy, published in 1593, recommends the juice of oranges, and of sour and austere plants. He advises that this juice should be put into soups, and that meat, while roasting, should be sprinkled with it. In the same year, the virtues of lemon juice in the cure of scurvy were experienced by Sir R. Hawkins, whose crew, while within the tropics, were affected with it in an extreme degree.

We have already given an instance of the extraordinary efficacy of lemon-juice as a preventive of scurvy, in the first voyage for the establishment of the East India Company in 1600. After this it seems to have been pretty generally used in the company's ships; and, in a medical work published in this country in 1636, it is recommended as the best remedy for scurvy.

From this time it is recommended by a series of writers who have treated of this subject †; and instances which show its extraordinary efficacy are to be frequently met with in our naval annals.

When Admiral Sir C. Wager commanded our fleet in the Baltic, in 1726, his sailors were dreadfully afflicted with scurvy. He had recently come from the Mediterranean, and had on board a great quantity of lemons and oranges, which he had taken in at Leghorn. Having often heard of the efficacy of these fruits, he ordered a chest of each to be brought upon deck, and opened every day. The men, besides eating what they liked, mixed the juice with their beer. It was also their constant diversion to pelt one another with the rinds, so that the deck was always strewed with them, and wet with the fragrant

* See Diseases of Seamen, p. 322. and 465., and Rouppé, *De Morbis Navigantium, Trans.*, p. 121.

† John Drawitz, 1647; Une Voyage aux Indes Orientales, par M. Dillon, M.D. 1683; Martin Lister, 1694.

liquor: the happy result was, that he brought his sailors home in good health. (*Mead on Scurvy.*)

Most of these proofs of the efficacy of oranges and lemons were collected by Dr. Lind, and published in his justly celebrated work on Scurvy in 1757. His earnest recommendation for the general employment of these fruits in the navy was, however, not acted upon for some time; the disease continued to depopulate our fleets, offering a striking example of the delay which sometimes attends the practical application of most important truths. To the cause of delay in the present instance, we shall allude particularly hereafter (see chap. on *Diagnosis*); at present we only mention the fact, as one of the most singular and instructive in the history of the disease. We have already noticed the prevalence of scurvy in our fleet in the West Indies in the years 1780, 1, 2, and in the Channel fleet in 1795. The history of these fleets afford numerous proofs of the efficacy of the fruits in question; but in 1794 an experiment was made which established it beyond doubt. The *Suffolk*, of 74 guns, sailed from England for Madras on the 2d of April, 1794. She was provided with lemon juice; and two thirds of a liquid ounce of this juice, together with two ounces of sugar, were mixed with each man's daily allowance of grog. The Suffolk was twenty-three weeks and one day on the passage, during which she had no communication with land. Scurvy showed itself in a few men in the course of the voyage, but soon disappeared on an additional quantity of lemon juice being given them; and the ship arrived at Madras, without the loss of a single man, and with her crew entirely exempt from scurvy.*

It is to the representations of Dr. Blair and Sir G. Blane, in their capacity of commissioners for the relief of sick and wounded seamen, enforced by the result of this experiment in the *Suffolk*, that we owe the systematic introduction of lemon juice into nautical diet, in 1795, by order of the Admiralty. We have already spoken of the improvement in the health of the navy consequent on this wise measure; but we may be permitted to mention the following circumstances which show how completely it has realised the expectations of its proposers.

In 1780, 1457 cases of scurvy were admitted into Haslar Hospital: in 1810, one of the physicians of that hospital informed Sir G. Blane that he had not seen a case of it for seven years; and, in the four years preceding 1810, only two cases were received into the naval hospital at Plymouth. At present, there are many surgeons in the navy who have never seen a case of scurvy, which has, in fact, been expunged from the list of diseases incident to seamen in the navy.

The present allowance of lemon juice in the navy consists of a fluid ounce, which, after ships have been a fortnight at sea, is served daily with an ounce and half of sugar to each of the men.

Dr. Lind recommended a *rob*, formed by evaporating the juice, by a slow heat, to the consistence of thick syrup. This was found to be very inferior in efficacy to the fresh fruit (*Diseases of Seamen*, p. 56.; *Med. Nautica*, vol. i. p. 425.); and Sir G. Blane, in consequence, advised that the juice should be preserved by the addition of a small quantity of spirit, without the aid of heat; a plan now generally adopted. The juice with which the navy is supplied is brought from Sicily, and kept good by the addition of one part of strong brandy to ten of the juice. When preserved in this manner, its virtues seem unimpaired.

These fruits, when employed in the treatment of scurvy, combine all the good qualities we can desire in a remedy. They have a specific influence in curing the disease, but produce no other sensible effect, except a small increase in some of the secretions; and the eating of them is attended with great pleasure. Dr. Lind tells us that he has often observed, upon seeing scorbutic people landed at our hospitals, that the eating of these fruits was attended with a

* Sir G. Blane, *Comparative Health of the Navy*.

pleasure more easily imagined than described; and his testimony is confirmed by that of other naval physicians.

Oranges, lemons, and limes, seem to have nearly equal efficacy; and perhaps the same may be said of shaddocks, and all fruits of a like kind. Dr. Lind, however, from some comparative trials, was led to give oranges a preference to lemons. It is probable that the state of the fruit, as to maturity, has considerable influence on its virtues. That such is the case with the guava, appears clearly from an experiment made by Dr. Trotter. Having repeatedly observed scorbutic slaves throw away ripe guavas, while they devoured green ones with much avidity, he resolved to try if any difference could be remarked in their effects. For this purpose he selected nine blacks affected with scurvy in nearly equal degree. To three of these he gave limes, to three green guavas, and to three ripe guavas. They were kept under the half-deck, and served by himself two or three times a day. They lived in this manner for a week; at the end of which those restricted to ripe guavas, were in much the same state as before the experiment, while the others were almost well.

Most sour fruits are in all probability antiscorbutic. The good effects of unripe grapes were noticed by Fodéré in the French army of the Alps, in 1795; and, in 1824, when scurvy prevailed among our troops at Rangoon, in India, great benefit was derived from giving the men the fruit of the *Phyllanthus Emblica*, or Anola; which, when dry, as sold in bazaars, has a rich and strongly acid taste, with a flavour resembling that of tamarinds. (*Quarterly Journal of the Med. and Phys. Society of Calcutta*, vol. i. p. 306.) The efficacy of apples, as a preventive of scurvy, was alluded to by Sir J. Pringle in an address to the Royal Society, in 1776; and the following proof of their curative virtues is given by Dr. Trotter:—When Lord Bridport's fleet arrived at Spithead on the 19th of September 1795, almost every man in the fleet was more or less affected with scurvy. Large supplies of vegetables were provided, and lemon-juice being scarce in consequence of the previous great consumption, fifty baskets of unripe apples were procured at the Isle of Wight for the use of the fleet. The *Royal Sovereign*, in particular, derived great benefit from them; and the cure of the disease was everywhere so speedy, that little remained to show Earl Spencer, when he visited the fleet at the end of the month. (*Med. Naut.*, vol. i. p. 420.)

As the expense of lemon juice offers great impediment to the employment of it in the commercial marine of this country, to the extent necessary for complete extinction of scurvy, it deserves to be ascertained whether the juice of apples preserved, like that of lemons, by the addition of a certain proportion of spirit, would not be an effective substitute.

All succulent vegetables that are wholesome, are perhaps, as well as fruits, more or less antiscorbutic; but this property seems to be possessed in the highest degree, by plants comprised in the order *Cruciferæ*, in which most of the vegetables in common use, as the cabbage, turnip, radish, water-cress, &c. are included.

In the earliest notices of scurvy, mention is made of the efficacy of herbs of this class in its treatment.

Rousseus, writing in 1564, informs us, that the common people cured themselves by scurvy-grass, brook-lime, and water-cresses. W. Cockburn, in a work published in 1796, entitled *Sea Diseases*, remarks the extraordinary efficacy of vegetables in the treatment of this distemper. As a proof of it he mentions the following circumstance:—When Lord Berkeley commanded the fleet in Torbay, Mr. Cockburn prevailed on his lordship to erect tents for the sick on shore. Above a hundred of the most afflicted scorbutic patients, perfect moving skeletons, hardly able to get out of their ships, were landed, and fresh provisions, including carrots, turnips, and other vegetables were given them. In a week they were able to crawl about; and before the fleet sailed, they returned healthy to their ships. The subsequent history of scurvy abounds with instances equally decisive; but the strongest proof of the efficacy of ve-

getables of this class, is derived from the fact that the disease, when it occurred on land, uniformly disappeared during summer and autumn; and that it gradually became less frequent as the consumption of vegetables increased.

There seems to be no country naturally destitute of remedies for scurvy. The fruits of tropical and temperate climates are replaced in countries within the polar circle by herbs of almost equal efficacy. We are told that in Greenland, where scurvy was formerly very common, the natives employed sorrel and scurvy-grass together, and that by these herbs, which were put into broths, the most advanced cases were cured in a surprisingly short time.*

Sir Edward Parry informs us that the Esquimaux eat sorrel but not scurvy-grass. In the narrative of his first voyage of discovery, he gives an instance from his own experience of the good effects of sorrel. He sailed from London in the beginning of May, 1819, and in the following spring scurvy showed itself in four of his men. In the early part of April, in consequence of a serious loss of lemon juice, from bursting of the bottles by frost, the daily allowance of it was diminished one third, and in the middle of June it was entirely discontinued. At this period the sorrel began to vegetate, and the men were enjoined to gather daily a prescribed quantity; in the month of August it increased almost to exuberance, and proved a most valuable anti-scorbutic.

The garden-cresses also have been especially noticed for their antiscorbutic qualities. It was suggested by Bachstrom, that the inhabitants of a besieged town, by sowing the seeds of these herbs on the ramparts, or even in their apartments, might, in a few days, furnish themselves with a fresh antiscorbutic salad. Dr. Lind † recommended the adoption of the same measure in ships during long voyages; and his advice has been recently followed by Sir Edward Parry. ‡ We have quoted the following passage from the narrative of the first polar expedition of this enterprising navigator:—"I began also about this time to raise a small quantity of mustard and cress in my cabin, in small shallow boxes, filled with mould, and placed along the stove pipe; by this means, even in the severity of the winter, we could generally ensure a crop at the end of the sixth or seventh day after sowing the seed; which, by keeping several boxes at work, would give to two or three scorbutic patients nearly an ounce of salad daily; even though the necessary economy in our coals did not allow of the fire being kept in at night. The mustard and cress thus raised were necessarily colourless from privation of light, but as far as we could judge, they possessed the same pungent aromatic taste, as if grown under ordinary circumstances, and appeared to be equally efficacious."

We have already spoken of the pleasure which scorbutic persons derive from eating oranges; in treatises on scurvy frequent mention is also made of their relish for fresh vegetables. Bachstrom tells us, that at the siege of Thorn, when some of the coarsest vegetables were sent into the town by the enemy, for the use of a particular family, they were seized on by the officers at the gates, and greedily devoured as the greatest delicacies. (*Haller, Disp. ad Morbos*, vi.)

It appears that the antiscorbutic virtue of vegetables is greatest when they are eaten raw. Herbs in form of salads are more efficacious than when boiled, or any way prepared by heat; and their antiscorbutic properties are entirely destroyed by drying. § Kramer tried a great variety of dried plants to no purpose; and the college of physicians at Vienna, when applied to by him, sent into Hungary a large supply of the most approved antiscorbutic herbs, prepared in this manner, but they were productive of no benefit.

* Lind, p. 214. Also, for a remarkable instance of the efficacy of scurvy-grass, see a paper by Bachstrom, published by Haller in Disput. ad Morbos, vi.

† Lind, p. 141.

‡ In his first polar expedition, Captain Parry sailed from London with the *Hecla* and *Griper*, on the 5th of May, 1819, and returned on the 26th of September, 1820.

§ See Lind, p. 170. Diseases of Seamen, p. 56. Phil. Trans. vol. lxviii. Obs. on Scurvy; by Dr. Mertans.

Pickles. But when vegetables are preserved as pickles, their antiscorbutic properties are etained.

It was observed that Dutch ships were formerly much less subject to scurvy than our own; and in some instances, when our fleet has acted in concert with that of the Dutch, our sailors have become affected with scurvy, while the Dutch continued free from it. This immunity on the part of the Dutch, was owing to the use of sour kroute, which was regularly supplied to their ships.

The extraordinary health of the *Centurion* in the memorable voyage of Captain Cook, seems to have been mainly owing to a liberal supply of sour kroute. A pound of it was served to each man twice a week, or oftener throughout the voyage.

In a paper published in 1770, in the *Transactions of the Royal Society*, Dr. Mertans informs us that, during a residence of many years in Moscow, he frequently met with cases of scurvy among gentlemen and merchants, but very rarely in persons in the lower classes. The comparative immunity of the latter, he ascribed to their eating plentifully, all the year round, sour cabbage soup and vegetables, which were sparingly used by the rich. whose diet consisted chiefly of fresh animal food and bread.

In 1780, *sour kroute* was furnished to our navy as a regular article of ship's provisions; and in the history of the fleet about that time, we find many proofs of its good effects. The allowance was two pounds a week to each man. (*Dis. of Seamen*, p. 140. 287.)

Sour kroute is prepared in the following manner:— The soundest and most solid cabbages sliced, as we slice cucumbers, are put into a barrel in layers, hand high; over each layer is strewed a handful of salt and carraway seeds; the whole is then rammed down, and the process continued till the barrel is full, when a cover is put over it and pressed down by a heavy weight. After standing some time in this state, the cabbage begins to ferment, and it is not till the fermentation has entirely ceased, that the barrel is finally shut up. Vinegar is not, as some have imagined, employed in the preparation of sour kroute. (*Cyc. Pract. Med.*, art. SCORBUTUS.)

In Austria, and several parts of Germany, people eat *sour turnip*, which is prepared in the same manner as sour kroute*; in fact, most vegetables may be preserved by this method; and we strongly recommend a trial of it, with scurvygrass and sorrel, to navigators who may in future be compelled to winter in the polar seas.

The fir-tribe deserve to be next mentioned, on account of their antiscorbutic properties. These, like many of our best remedies, were discovered by chance. When the Swedes were at war with the Muscovites, almost all the soldiers in the Swedish army became affected with scurvy. Its progress was arrested by the use of a simple decoction of fir-tops, which was found equally efficacious as a preventive and a remedy. This medicine acquired, in consequence, great reputation, and the common fir, *Abies rubra*, was afterwards called *Pinus antiscorbutica.*

The mountain pine, *Pinus sylvestris*, has likewise been found highly antiscorbutic. In 1736, two squadrons, fitted out by the court of Russia, were obliged to winter in Siberia. One, not far from the mouth of the river Lena, was attacked by scurvy. The sailors, in their distress, by chance found this tree growing in the mountains near them, and discovered that it had a most surprising antiscorbutic virtue. At the same time, the crews of the other squadron, who were passing the winter in the river Judoma, were much afflicted with the same disease. They, too, chanced on the pines, which grew plentifully on the mountains, and by the use of them, in decoction, were all perfectly restored in a few days. In some. this medicine proved gently laxative; in others it affected the body so mildly, that its operation was scarcely sensible. (*Lind*, p. 177.)

* See Phil. Trans. vol. lxviii.

From the description given by Cartier of the *Ameda* tree * (by a decoction of the leaves and bark of which his crew were so speedily cured), it would seem that it was the large spruce tree of American swamps. All pines and firs, indeed, though differing from each other in form and appearance, seem to have analogous medicinal virtues, and great efficacy in the prevention and cure of scurvy.

Onions, garlic, and vegetables of the same class, were at one time much used for the prevention of scurvy at sea; but they are now very rarely employed for that purpose.

Potatoes also, when raw, seem to be antiscorbutic; and Sir G. Blane informs us that, in 1780, they were used with advantage in the fleet. (*Dis. of Seamen*, p. 57.) They will keep a considerable time in a warm climate, and in point of economy have an advantage over most articles employed as antiscorbutics.

Infusion of malt, which had been before recommended as a remedy for scurvy†, was employed for that purpose by Captain Cook, who speaks in very high terms of it. He took with him in the *Centurion*, a large supply of malt, for the purpose of making sweet wort, of which from one to three pints were given daily to each man.‡ The good effects of wort in the treatment of scurvy have also been noticed by others. §

In 1780, our fleet in the West Indies was supplied with essence of malt. We are told by Sir G. Blane, that it proved of service; but its antiscorbutic properties were inconsiderable; so much so, that some of the surgeons even denied that it had any. It was only in the early stages of the disease that the effects of it were sensible. (*Ibid.* p. 55. 141. 464.)

We can reconcile this with the testimony of Captain Cook, and others, in favour of the antiscorbutic properties of infusion of malt, only by supposing that those properties were impaired by the process of extracting the essence; just as those of lemon juice are impaired in the preparation of syrup.

Molasses, also, was recommended about the same time; and, in the *Foudroyant*, the ship in which it was first tried, it answered so well, that in a cruise under Admiral Geary, in 1780, she was the only ship in the squadron that was free from scurvy, which prevailed to such extent in the other ships, that, on their return to Portsmouth, in the month of August, 2400 men were sent to the hospital affected with it (*Ibid.* p. 290.)

Subsequently, by order of Lord Howe, molasses was served with rice to the men who were scorbutic, or threatened with scurvy, in the squadron which he commanded; and the benefit derived from it was so great, that, during the last two years of the war, molasses was made a regular article of ships' victualling, and substituted for a certain proportion of oatmeal. (*Ibid.* p. 287.)

The disease was unquestionably much mitigated by this regulation, but was far from being entirely prevented. It prevailed even to a great extent in some ships well supplied with molasses. (*Ibid.* p. 55.)

There is reason to believe that the antiscorbutic properties of sugar-cane are greater than those of molasses, and that they are much impaired by the process employed in the manufacture of sugar.

Fermented liquors. Spruce beer seems to be the most efficacious of fermented liquors. We have abundant proof in the experience of the Northern American colonies, and of the countries bordering on the Baltic, that it is not only an effectual preventive, but an excellent remedy. It has this advantage, that materials for it can often be procured, at all seasons, in countries in high latitudes, where the scarcity of fruits and vegetables renders a powerful antiscor-

* Cartier says, " It wrought so well, that if all the physicians of Montpellier and Louvain had been there with all the drugs of Alexandria, they would not have done so much in one year as that tree did in sixe dayes; for it did so prevaile that as many as used of it, by the grace of God, recovered their health." (*Hakluyt's Coll. of Voyages*, vol. iii.)

† Method of Treating the Scurvy at Sea, and Use of Wort in it. London, 8vo. 1767. (Anonymous.)

‡ Phil. Trans. 1776. Address by Sir J. Pringle.

§ Med. Obs. and Inq. vol. v. *On the Use of Wort in the Cure of Scurvy:* by J. Badenoch, M.D.

butic extremely valuable. These materials can also be carried about, and used occasionally; a plan adopted by Captain Cook with great advantage.

Malt liquors possess similar virtues. Frequent notices of the benefit derived from the use of small beer at sea, are to be met with in the writings of our naval physicians; and Sir G. Blane has recorded a striking instance of the good effects of porter. (*Dis. of Seamen*, p. 301.) Instances are also to be found which afford evidence of the antiscorbutic properties of cider. (*Lind*, p. 150.; *Sir J. Pringle's Address to the Royal Society*, p. 15.)

Wine ranks next to spruce beer and malt liquor in efficacy, and it is perhaps to the habitual use of it that must be ascribed the fact, that the French fleets have generally been less subject to scurvy than our own.

The superiority of wine over spirits in this respect has, indeed, been frequently noticed; and Sir G. Blane was so convinced of it, that in a memorial, presented to the Board of Admiralty in 1781, he recommended the substitution of wine for rum in the victualling of the fleet. He agrees with Dr. Lind in ascribing even a pernicious influence to distilled spirits.* (*Lind*, p. 81.; *Dis. of Seamen*, p. 334.)

The good effects derived from the use of lemons and other sour fruits, were naturally attributed to their most striking quality, acidity, and it was imagined that *vinegar* would prove of equal service. It was, in consequence, early recommended as a preventive of scurvy. Experience, however, has shown that this opinion is unfounded. Dr. Lind, in the middle of last century, when scurvy proved so destructive in our fleets, remarked that few ships had ever been in want of vinegar. (*Lind*, p. 158.) Testimony to the same effect has been given by other naval physicians. Vinegar was liberally supplied to our fleet, in which scurvy was so fatal, in the West Indies in 1780, and the two following years (*Dis. of Seamen*, p. 284.), and Dr. Trotter, in his account of the health of the channel fleet, in 1795, says that vinegar was carefully served to the messes of seamen, throughout the squadron, to be used with the salt meat; yet in those ships, in which the men took it in large quantities, it was not observed to retard the progress of the disease. (*Med. Naut.*, vol. i. p. 418.)

Our own experience furnishes us with many instances of the occurrence of scurvy in a high degree, in ships well supplied with vinegar, even in voyages of moderate duration; but, in the cases in which we have witnessed the disease in the most aggravated form, the crews had no regular allowance of this article. From the facts that have fallen under our own notice, we are led to ascribe to vinegar some antiscorbutic virtue, equal perhaps to that of malt liquor or cider, but not sufficient to render it a substitute for lemon or lime juice. There is indeed some degree of contradiction in the testimony of naval physicians respecting the antiscorbutic properties of vinegar, which renders it likely that these vary in some degree with the material from which the vinegar is prepared.

All the substances which we have mentioned as preventives of scurvy, are derived from the vegetable kingdom; and it is probable that antiscorbutic properties are possessed exclusively by substances of vegetable origin. All the mineral acids, and, indeed, most medicines derived from the mineral kingdom, have been tried without success. The antiscorbutic virtue is, as we have seen, possessed in very different degrees by different classes of vegetables and fruits, but in the lowest degree, if at all, by those which are farinaceous. Dr. Lind remarked that scurvy was most commonly met with, on land, in persons who subsisted chiefly on dried or salt fish or flesh, and the unfermented farines; or upon bread made of peas, or a composition of peas with oats. (*Lind*, p. 93.) Kramer informs us that in his time the disease often occurred in Germany among people, who lived altogether on boiled pulses, without eating any green vegetables or summer fruits. We have already mentioned the prevalence of

* The opinion that distilled spirits have a pernicious influence, is warmly opposed by Dr. Nathaniel Hulme in a Latin thesis, in which the reader will find an elegant and very accurate description of the symptoms of scurvy. (*Dissertatio Inauguralis, De Scorbuto.*)

scurvy among Russian soldiers, whose principal food was rye-bread, and meal, and among the inmates of the lunatic asylum at Moorshedabad, where rice and split peas formed the chief articles of subsistence. Its occurrence has also been noticed in prisoners kept on a diet of bread and water. (See a *Letter on Solitary Confinement*, by J. G. Malcolmson, Esq.)

Fresh leavened bread has, however, been supposed to be highly antiscorbutic, and has, in consequence, been recommended by many writers on scurvy; but we must bear in mind that the good effects, ascribed to it, have been witnessed in sailors, on their return from a long voyage, who were supplied not only with fresh bread, but also with vegetables, the efficacy of which was probably not duly appreciated. The antiscorbutic properties ascribed to bread, seem incompatible with the fact, of which we could bring many proofs, that scurvy may occur in persons with whom bread forms the main article of subsistence.*

It has been supposed that flour is antiscorbutic in a much higher degree than biscuit, which has been subjected to the influence of a strong heat; and Sir G. Blane in consequence recommended that in the navy a portion of the present allowance of biscuit should be discontinued, and compensation given in flour, which might be made into bread or puddings. This advice was followed by Sir Edward Parry, who, in his first Polar expedition, by taking with him a supply of flour, was enabled to furnish his crew with a daily allowance of well fermented bread.

There is, however, a preparation of oat-meal, which seems to have great efficacy in preventing and curing scurvy. This is *sooins*, or *sowens*, an article of food well known in Scotland. It is prepared by pouring hot water on some oatmeal in a wooden vessel, and allowing it to stand till the liquid grows acidulous, which, in a place moderately warm, happens in about two days; the liquid is then poured off from the grounds, and boiled down to the consistence of jelly. Sir J. Pringle has given a remarkable instance, not however from his own experience, of the efficacy of this preparation †; and Sir G. Blane considered it of equal virtue with any antiscorbutic, except the juice of oranges and lemons; and informs us that he knows some well attested instances of crews saved from scurvy by this alone. (*Dis. of Seamen*, p. 291.) It would be interesting to ascertain whether the acetous fermentation, excited as in sooins, would impart similar properties to other farinaceous substances. ‡

We have already given examples of the occurrence of scurvy, in the highest degree, in persons well supplied with fresh animal food; and instances are not wanting, which show that food of this kind is without much efficacy as a remedy. Dr. Lind tells us that in the *Salisbury*, during a Channel cruise in 1746, the scorbutic people, by the liberality of their commander, were daily supplied with fresh provisions, such as mutton broth and fowls, and even meat from his own table; yet, at the expiration of ten weeks, they brought into Plymouth eighty men, more or less afflicted with scurvy, out of a complement of 350. (*Lind*, p. 66.; see also *Lind*, p. 137. and *Dis. of Seamen*, p. 462.)

The opinion that scurvy can be prevented, or cured by fresh meat, is however still held by persons, by whom it is of the utmost importance that correct notions on this subject should be entertained. We have known the most fatal effects result from the erroneous opinions of captains of merchant vessels on this point. During the course of the present year, the captain of a vessel trading to the Mauritius furnished his men, while they stayed at the island, with a plentiful

* See Med. Trans., vol. iv.: and vol. ii. paper by Dr. Milman.

† Address to the Royal Society in 1776, p. 18.

‡ The antiscorbutic properties of sooins require to be substantiated by facts. In the instance mentioned by Sir J. Pringle, no detailed account of the circumstances is given; it is noticed, however, that the sooins was seasoned with some prize wine which had turned sour, and which may with reason be supposed to have had some share in restoring the men. Sir G. Blane is content with expressing his opinion of the efficacy of sooins, without stating the facts on which that opinion was founded.

supply of fresh beef, which, being imported from Madagascar, is procured at considerable expence; but neglected to provide them with vegetables or limes, which abound in the island, and are sold at a price scarcely worth naming. The consequence was that scurvy broke out soon after they set sail; and before the ship arrived in this country, one half of the men before the mast had died of it, and the rest were totally disabled.

Portable soup was much used by Captain Cook, and has been extensively employed by Sir Edward Parry, and other modern navigators. Its antiscorbutic properties must depend chiefly on the vegetables it contains.

The facts we have adduced seem to lead to the following general conclusions: —

1. That antiscorbutic properties reside exclusively in substances of vegetable origin.

2. That these properties are possessed in very different degrees by different families of plants; and that vegetables and fruits, which are farinaceous, possess them in the lowest degree; while all those, which possess them in a very high degree, are succulent.

3. That the antiscorbutic virtue resides in the juices of the plant; that it is, in general, considerably impaired by the action of strong heat, and by the process of vinous fermentation; and that it varies, in some degree, with the state of maturity of the plant from which it is derived.

4. That these properties of vegetables are not destroyed, but in some instances seem even to be developed by the process of acetous fermentation.

We are ignorant of the essential element, common to the juices of antiscorbutic plants, on which the properties in question depend; but shall, probably, not be deemed too sanguine, if we anticipate that the study of organic chemistry, and the experiments of physiologists, will at no distant period throw some light on this subject,

We cannot bring this part of our subject to a conclusion, without insisting on the importance of making a certain proportion of succulent vegetables an occasional article of food in jails, poor-houses, and especially in lunatic asylums *; in fact, in all establishments where persons are kept a long time on a diet regulated by principles of economy, and subject to little variation. In the provisioning of troops, also, in districts which have been laid waste, or where the winter is long and severe, we would recommend the adoption of the same measure, particularly during spring; and, in cases in which difficulty of procuring fresh vegetables is likely to arise, that lemon juice, as in the navy, should be provided in their stead.

Such a regulation would, we believe, contribute much to the health of the men, and would effectually prevent scurvy, which, we have little doubt, occurs much more frequently under the circumstances we have mentioned, than is generally imagined. The approach of the disease is, in fact, so gradual, that it may advance far enough to reduce the strength of the men considerably, before the real nature of it is discovered by a surgeon, not familiar with its symptoms or not expecting to meet with it. Dr. Murray, in the report from which we have derived the account we have given of the prevalence of scurvy among our troops at the Cape, in the autumn of 1836, informs us that such was the case in that instance: "that it was not recognised for some time after it appeared, nor until the morbid diathesis had widely extended itself in the corps." He adds also, "I candidly confess that, although I had before treated

* We have already mentioned, that the inmates of the Lunatic Asylum at Moorshedabad are annually affected with scurvy; while those of the jail, which is very near the asylum, continue free from it. In the Lunatic Asylum at Madras, also, scurvy occasionally shows itself. The greater frequency of scurvy in lunatic asylums, than in other establishments in which the diet is in no respect better, is, we imagine, not owing to greater liability to the disease in lunatics, but to the great length of time they remain in those establishments. In the Milbank Penitentiary, in 1823, scurvy first appeared in those who had been longest confined there. The occurrence of scurvy in persons long insane, has also been noticed in this country. (See *Prichard on Insanity*, p. 149.)

cases of this malady, I did not know it by its proper name, but used incorrectly to return it under the heads, Purpura, Cachexia, Neuralgia, Rheumatism, Œdema, &c. until its late extraordinary prevalence in the 75th regiment, (at the Cape), and the recent admission into the civil hospital there, from whaling vessels, of a number of sailors affected with it; which attracted my particular attention to its diagnosis."

Symptoms. A change in the complexion, from its natural healthy tint to a pale, slightly sallow, and dusky hue, is generally one of the earliest indications of scurvy. This change is attended with great languor and despondency, and with aversion to every kind of exercise, and the patient is readily fatigued, and complains of pains in the muscles, especially of the legs and loins, like those produced by over-exertion. The gums soon become sore, and apt to bleed on the slightest touch. On examination, they are found to be swelled and spongy, and of livid redness. Lividity of the gums first appears, and is always deepest at their free edges, diminishing gradually towards the roots of the teeth; while the lining membrane of the lips does not exhibit it in the slightest degree, but, on the contrary, is unusually pale.

As the disease advances, all these symptoms become more marked; the complexion acquires a more dingy and somewhat brownish hue; the debility increases, so that the least exertion causes breathlessness and palpitation, and not unfrequently an alarming syncope; the gums become more swelled and more livid, forming, in some cases, a black spongy mass, which completely conceals the teeth, and they frequently slough, especially at their edges, leaving the crowns of the teeth exposed; the teeth themselves become loose. and often drop out, without having suffered decay; and the breath is remarkably offensive.

The patient, from the beginning of the affection, is subject to hæmorrhages. These occur most frequently from the gums and nose, and from any ulcers he may happen to have; but often, also, from the intestines; occasionally from the stomach; and, in some rare instances, from the bladder. Of the last nine cases that have fallen under our observation, in all which the disease was advanced, seven presented epistaxis. In most of these, bleeding from the nose occurred, for the first time, at an early period of the disease, and recurred several times, but in all it ceased spontaneously. In three of these nine cases, blood had been passed by stool: it is probable that hæmorrhage from the intestines happened in a greater number of these cases, but was unobserved. In none of them was there any hæmorrhage from the stomach, lungs, or bladder. In taking notes of these cases, great attention was paid to this point. Of twenty-seven cases, the notes of which were taken previously, but not with equal care, three presented hæmetemesis; and in one of these three the vomiting of blood recurred several times. We have never had a patient affected with scurvy in whom hæmorrhage from the bladder, or hæmoptysis, was stated to have occurred.*

Ecchymoses also appear on the skin, in the form of petechial spots, particularly on the lower extremities; often, however, in advanced stages of the disease, on the arms and trunk, but rarely on the head or face. These petechiæ, which are sometimes very numerous, are generally small and circular; the centre of each spot being the point at which the skin is perforated by a hair. Besides these petechial spots, we often meet, especially when the disease is far advanced, with other spots, as large as the palm of the hand, sometimes much larger, in which the skin is of a variegated violet and green tint, and which resemble in every respect marks produced by a severe bruise. These bruise-like marks occur without the infliction of any blow, or at least of one sufficient to attract the patient's attention, and often surround an old scar, or appear on a part, which, a long time previously, had been the seat of some injury. Like the smaller

* We have stated that hæmorrhages occasionally take place from the bladder, on the authority of Dr. Lind, and other authors.

petechial spots, they are met with most frequently on the lower extremities, but are not uncommon on the arms and trunk, and in a few instances we have observed them along the border of the lower jaw. Effusions not, we imagine, of pure blood, but composed chiefly of its fibrinous portion, take place also in deep-seated cellular tissue, and between layers of muscles, particularly in the legs and thighs. The parts which are the seat of these effusions are painful, when pressed or moved, and are much swollen, and of a hardness like that of board, so that they resist the strongest pressure of the finger. The skin covering these parts is thickened, and firmly adherent to the parts beneath *, from which a fold of it cannot be pinched up: it sometimes retains its natural colour, but more commonly presents the appearance of a bruise.

These effusions are sometimes very partial, frequently confined to the calf or thigh of one leg; but their most common seat is the ham, where the swelling is often very considerable, and always attended with stiffness and contraction of the knee-joint. This swelling of the ham and contraction of the knee-joint, a symptom which has much attracted the attention of writers on scurvy, sometimes occurs very early, and in cases in which the other symptoms are mild. In a patient at present under our care, in whom the other symptoms of scurvy are by no means severe, the calf and ham of the left leg are much swollen, and the knee-joint is stiff and contracted, the leg being at right angles to the thigh. This swelling of the ham, and contraction of the knee-joint, came on at a very early stage of the complaint, and were attended with pain on any attempt to move the leg, and with some degree of tenderness on pressure, symptoms which have ceased, however, after a treatment of two or three days: the parts which are thus swollen are hard and brawny, and no impression is left by the finger, except over the tibia, where there is some pitting. The skin is thickened, and glued to the parts beneath, but presents no discolouration, except on the inner aspect of the calf, where, in a space nearly as large as the palm of the hand, it has the appearance of a bruise, and gives to the hand a sensation of greater heat than elsewhere. There is not at present, nor has there been from the commencement, any swelling or œdema of the foot. There are a few scattered petechiæ on this, and on the opposite leg, which is free from swelling, and of which he retains the perfect use.

Contraction of the joint (which has been ascribed in such cases to contraction of the tendons), as well as swelling of the ham, result we imagine, from a solid effusion, chiefly of the fibrinous part of the blood, between the tendons and the bone; which, acting as a foreign body, prevents the tendons from coming in opposition to the bone, which is necessary for extension of the leg.

Stiffness and contraction, such as we have described, are not peculiar to the knee-joint. Instances are mentioned by authors of similar contraction of the elbow-joint (See *Phil. Trans.*, vol. lx. paper by Dr. Mertans); and, in a case which has recently come under our notice, both ankles were affected in like manner. In this patient there was no swelling of the calves or contraction of the hams, but the feet were extended and the heels drawn up, as in that form of club-foot, which has been designated Pes equinus.† When he attempted to stand, his toes only came in contact with the ground; and, if while he was seated, his feet were placed flat on the ground, and kept so, on making an effort to rise he fell backwards. The skin over the tendo Achilles was in both ankles the seat of an extensive bruise mark.

We have stated that the skin of the swelled and indurated calves and hams, sometimes retains its natural colour; this seems to depend on the effusions taking place beneath the fascia, without involving the subcutaneous cellular tissue. But even in such cases the skin is thickened and brawny, as if in-

* This does not depend on the skin, being stretched. We have found the skin adherent in this way over the calf when the latter has been very slightly swollen, and but little larger in circumference than the calf of the opposite leg, which was unaffected.

† Similar cases have been noticed by Baron Larrey, *Mém. de Chir. Militaire*, tom. ii.

filtrated with the fibrine of the blood, and is firmly adherent to the parts beneath.*

The situations we have mentioned are not the only ones in which such effusions take place; they occur also very frequently between the periosteum and bones, causing node-like swellings, which are often exquisitely tender. We have met with these on all the long bones of the lower extremities, but most frequently on the tibiæ; they often occur also on the rami of the lower jaw, where they are marked by swelling of the lower part of the face, following the outline of the jaw, and by great tenderness on pressure; and in one instance we have seen a swelling of the same kind, on the roof of the mouth, occasioned by an effusion under the periosteum of the palate bone.

The effusions, whether of blood or of fibrine, are never followed by suppuration, and, when they exist between the periosteum and bone, do not, however great their extent, lead to exfoliation of the bone. Under the influence of appropriate general treatment they become absorbed: the petechiæ and bruise-marks on the skin disappear in the same manner as when occurring in ordinary circumstances: when the effusions are more deeply seated, the absorption of them is marked by diminution of swelling, and of pain when the limb is moved: the node-like swellings of the periosteum become rapidly less tender, diminish in size, continuing however, for some time to pit on pressure, and gradually disappear.

The extent to which these effusions take place is very variable; although occurring under the influence of slight, often inappreciable causes, they seem in some degree accidental, and do not afford a correct measure of the severity of the disease. Swelling and contraction of the ham, for instance, is often witnessed in one leg only, and sometimes at an early period, while in other cases, even in advanced stages, it does not exist at all. Like variation is observed, in the extent and number of petechial spots, bruise-like marks, and nodes, and in the time of their occurrence.

It is to the effusions, especially to those between the periosteum and bones, that we must ascribe the pains scorbutic persons suffer. These pains are confined to the parts in which effusions exist, and are consequently most common in the legs and jaws †; they are not increased by the heat of the bed, and are not more severe at night than by day; the patient, when quite still, is at ease, but the exertion of walking, and, in advanced stages of the disease, even the act of turning in bed, or any attempt to move the affected limbs, is productive of great suffering.

If a scorbutic person have any wounds or ulcers, these assume a peculiar aspect. At first, the discharge from them is thin and sanious; later in the disease it coagulates, forming a dark crust which adheres to the surface of the ulcer, and is with difficulty separated from it. If this separation be effected, the ulcer is apt to bleed, and the crust, which consists chiefly of coagulated blood, is formed again in a few hours. Underneath this crust the surface of the ulcer is soft and spongy; and livid, fungoid granulations sprout up at its edges. In a still more advanced stage, the surface of the ulcer is covered with a soft dark coagulum, which, when scurvy was more common than at present, was familarly termed by sailors *bullock's liver*, from its resemblance in colour and consistence to that substance boiled. This coagulum often rises in course of a night to a size that would scarcely be credited, and if destroyed by cauterisation, or the knife (in which case copious hæmorrhage generally ensues), it is reproduced in a few hours, appearing at the next dressing as large as before. (*Lind.*) The slightest wounds and scratches, which in ordinary circumstances would be scarcely noticed, are apt in scorbutic persons to de-

* Occasionally, when a scorbutic person has received a slight blow or contusion, there is an effusion of actual blood under the integument, or between the muscles; but this forms a soft, indolent tumour, and remains liquid until it is absorbed. It is very different from the ordinary effusions in scurvy, which are painful and solid from the commencement.

† Headach, properly so called, is rarely, if ever, experienced by scorbutic persons.

generate into ulcers of this description. These ulcers continue without much change until the scorbutic habit is corrected. It is worthy of remark, that they rarely become gangrenous, and that they may exist for a long time on the spine of the tibia, and other parts, without affecting the bone.

Not only wounds and ulcers, but all eruptions on the skin, particularly when seated on the lower extremities, assume in scorbutic persons a livid or purple colour. It is the modification produced by the scorbutic habit in these cutaneous affections, that in many instances certainly has given rise to the varieties described by authors as lichen lividus *; ecthyma cachecticum, &c.

The symptoms we have described are all the effects of a common cause, but have no mutual dependence, and the order of their succession is not constant. When the scorbutic habit is established, parts previously debilitated are the first to assume the characters peculiar to scurvy. If, for example, the patient have lately been mercurialised, it is in the condition of the gums that the disease will be first manifested ; if he have recently suffered a sprain of the ankle, that part by becoming swelled, painful, and soon after covered with ecchymoses, will give the first token of scurvy †; if he have any ulcers, or eruption on the legs, these will be the first to put on the scorbutic appearance even before a change in the complexion has led to a suspicion of the disease.

The pulse in scurvy is generally slower and more feeble than in health, and the patient is frequently chilly ; but occasionally, especially when the disease is far advanced, we find the skin hot, and the pulse attaining, or even exceeding the rate of 120 a minute. This variation in the temperature of the skin and in the frequency of the pulse, has given rise to the designations *hot*, and *cold* scurvy ; and for a long time it was imagined that there was some essential difference between these forms. In all the cases in which we have witnessed quickness of pulse and heat of skin, there have been effusions between the muscles, or between the periosteum and bones ; the tumours caused by these effusions were exquisitely tender, and the slightest movement of the limbs occasioned great suffering. It is to an inflammatory action, connected with the presence of these effusions, that we are inclined to attribute the fever in such cases. ‡ (*Lind*, p. 390. 2d. ed.)

The natural secretions are scanty. There is suppression of perspiration, and the skin is dry and rough, and of the aspect, which has obtained the popular designation, " goose-skin." This, however, is not universally the case: the skin of the swelled legs is most frequently smooth and shining, from distension ; and we have met with one instance in which, at an advanced stage of the disease, the patient was subject to profuse sweats, — a peculiarity for which nothing in his history enabled us to account. After he came under our notice,

* Willan remarks, that in this variety of lichen the papulæ, which are found chiefly on the extremities, are sometimes intermixed with petechiæ, or with larger purple patches and vibices. He notices the affinity which it has to scurvy, and which is shown by its arising under similar circumstances, and yielding to the same mode of treatment. (*Cutaneous Diseases*, p. 51.)

Biett says that in this form of lichen, which occurs in persons weakened by distress and privations, the papulæ are seated chiefly on the lower extremities, and are often mixed with purple, or hæmorrhagic spots. He observes that it is extremely rare. In the time of Willan it was probably much more common in England than in France, for the reasons we have stated when speaking of the causes of scurvy.

† We have more than once observed, in sailors admitted into the *Dreadnought* on account of scurvy, an extensive bruise-mark on the knee or ankle, to which a blister had been applied some time previously under the idea that the pains which the patient suffered in the limb, and which were in reality scorbutic, were owing to inflammation affecting these joints. In such cases the blister rises well, discharges serum as usual, and heals readily ; but in the course of some days the patient finds the part tender to the touch, and by observing that it is the seat of an extensive deep violet coloured spot, first discovers the real nature of his complaint.

‡ In such cases, when blood is taken from the arm, the clot contracts firmly, and has a buffy coat. The effusions between the muscles, and under the periosteum, which are so common in scurvy, do not result from simple hæmorrhage. The fluid poured out is not pure blood, which always remains soft, and in some measure liquid ; nor serum, which causes œdema ; but a fluid, which *glues the parts together*, and gives a feeling of hardness. It can be no other, therefore, than the fibrinous portion of the blood ; mixed, it may be, with a small proportion of the other constituents. The process is not wholly passive, but gravitation seems to have something to do with it, and the state of the blood still more. With these conditions, the process may properly be called inflammatory.

he was plentifully supplied with lemon juice, which seemed to increase the perspiration, so that at the end of two days his chest was found covered with sudamina.

The urine is transparent, but high-coloured and scanty: it is, however, quickly restored to its normal condition. We have examined the urine in numerous instances after the patients had drunk freely of lemonade for two or three days, and have then almost uniformly found it nearly natural in colour and quantity; transparent; imparting a red tint to litmus paper; and not losing its transparency by the action of heat or nitric acid. The bowels are, in some cases, regular throughout the whole course of the disease; but they are more frequently, and indeed generally, confined. We have met with instances in which the patients have had no discharge from them for seven or eight days. The evacuations present, in general, no remarkable appearances. But, though usually costive, scorbutic persons are liable to occasional liquid stools, which are uncommonly fœtid, and probably consist chiefly of altered blood. The secretion of saliva is generally natural: we have never witnessed a case in which spontaneous salivation occurred. It has been remarked, however, by Dr. Lind and others, that scorbutic persons are very susceptible of the influence of mercury, and that very small quantities of this medicine are sufficient to bring on copious and dangerous salivation. (*Lind*, p. 126. *et alia.*)

The tongue is almost always, clean, moist, and pale. In some instances, in which there was unnatural heat of skin, with quickness of pulse, we have remarked the tongue to be small; but, when these febrile symptoms are absent, we often find it broad, and its edges indented. The inside of the lips is also clean, smooth, and extremely pale, presenting the aspect which it has in chlorosis. The contrast between the pale, bloodless lips, and the livid and spongy gums is very striking. The lividity and sponginess is always *limited to the gums*, ceasing abruptly at the reflexion of the lips, and of the mucous membrane connecting the tongue and interior of the lower jaw, and seldom extending over the palate to a distance of more than two or three lines from the teeth. In some rare instances, however, the lividity extends nearly all over the hard palate; but we have never seen either the lips, the inside of the cheeks, the tongue, or the fauces, present any thing but the pallid appearance we have described.

The patient frequently acknowledges slight degree of thirst; but the appetite, in almost all cases unattended with fever, continues, even in advanced stages of scurvy, as good as, or better than in health, and the powers of digestion remain unimpaired. Patients have often spoken to us of the sufferings they endured, before their arrival in port, from hunger, which the state of their gums did not allow them to appease by their hardened ship's provisions.

In early stages of scurvy patients generally sleep well; but when the disease is far advanced, one of the most constant symptoms is indisposition to sleep, for which these persons can often assign no cause.

The intellect is, in all cases, unaffected; the memory remains clear; and the patients, though much dejected, talk rationally to the last moment of their lives. Their senses also continue perfect. Sir Gilbert Blane (*Dis. of Seamen*, p. 461.) has, indeed, remarked weakness of the eyesight as an occasional symptom, but it is not mentioned by other authors, and must be of rare occurrence.* Our own experience furnishes us with only one instance in which any defect of vision was complained of: this was in a man highly scorbutic, and at the same time dropsical from organic disease of the kidney. He died while under our care; and for a week before his death complained that his sight was dim, and that all objects appeared green. In those cases of scurvy,

* Dr. Hulme relates the case of a man affected with scurvy, who could see only in a strong light. He suffered no pain in the eyes, which appeared clear and healthy, except that the pupils were dilated. The pupils were, however, sensible to every variation in the intensity of light. This symptom disappeared with the ordinary scorbutic symptoms. (*Hulme, De Scorbuto.*)

in which we have remarked the state of the pupils, we have generally found them dilated.

We have already spoken of the debility, and the tendency to swoon, in persons affected with scurvy. In high degrees of scurvy this tendency is so great, that the slightest motion, the erect posture even, occasions fainting, which sometimes proves fatal. The fact that scorbutic persons not unfrequently expire suddenly, on any exertion of strength, has, indeed, been noticed by all writers on scurvy, as constituting one of its most remarkable features. It is well expressed in the following passage, which we have quoted from the narrative of Lord Anson's voyage:—"Many of our people, though confined to their hammocks, ate and drank heartily, were cheerful, and talked with much seeming vigour, and in a loud, strong tone of voice; and yet, on their being the least moved, though it was only from one part of the ship to another, and that in their hammocks, they have immediately expired; and others, who have confided in their seeming strength, and have resolved to get out of their hammocks, have died before they could well reach the deck. And it was no uncommon thing for those who could do some kind of duty, and walk the deck, to drop down dead in an instant, on any endeavours to act with their utmost vigour; many of our people having perished in this manner during the course of this voyage."

When the disease is considerably advanced, the breathing is often quicker than natural, the inspirations attaining the rate of twenty-four to twenty-six a minute, without cough or complaint of pain. We have generally found this symptom of the frequency of the act of breathing associated with increased frequency of the pulse. Occasionally, in the latter stages of the disease, the breathing is still more rapid, the inspirations thirty-six a minute, or more, and the patient has cough, and expectorates frothy mucus, or a transparent fluid of mucilaginous consistence. Towards the close of the malady the dyspnœa sometimes becomes extreme. When speaking of the morbid anatomy of scurvy, we shall give the details of a case in which this circumstance occurred.

We have recently practised auscultation and percussion on six patients under our care at once, affected with scurvy in a high degree; and with the same result in all. The chest was everywhere unusually resonant, and the respiratory murmur louder than natural, and pure.* The sounds of the heart were loud and extensive, but unaccompanied by any morbid bruit. In these cases the condition of the abdomen was observed at the same time; in all it was soft and flaccid, and without tenderness on the strongest pressure; in none could the liver or spleen be felt below the false ribs.†

We have already mentioned, that parts previously debilitated or injured are especially prone to assume the scorbutic appearance. Our own experience furnishes us with two instances which may serve as illustrations of this fact. The first occurred in a man, aged 60, who was admitted into the *Dreadnought*, on the 18th of April, 1837, in the last stage of scurvy. On the middle of his left shin was a livid spot, larger than the palm of the hand, and in the centre of this spot, a scar, which, he assured us, had been there twenty years, and resulted from a wound caused by the kick of a horse. The second instance was in a man aged 55, who came into the *Dreadnought* on the 4th of June, 1837. The right foot was swollen and painful, and all the outer part of that foot and ankle was the seat of an extensive bruise mark, which surrounded a scar occasioned by a blow he received in 1813.

In high degrees of scurvy it is not unusual for ulcers, long healed, to break out afresh. Lord Anson relates the case of a man on board the *Centurion*,

* The unusual resonance on percussion of the chest, results probably from an anæmic condition of the lungs. (See cases in the chapter on the MORBID ANATOMY OF SCURVY.)

† An account, published by Dr. Mead, of the dissection of a man who died of scurvy, and whose spleen weighed five pounds and a quarter, has, from the dearth of facts, illustrative of the morbid anatomy of scurvy, been quoted by many subsequent writers. This man, who came from Sheppey, was affected with ague as well as with scurvy; and it is, unquestionably, to the former disease, that the very large size of the spleen must be ascribed.

who had been wounded fifty years before at the battle of the Boyne. "His wounds soon healed, and had continued well for many years, when, in the progress of scurvy, they broke out afresh, and seemed as if they had never been healed; nay, what is still more extraordinary, the callus of a broken bone, which had been completely formed for a long time, was found to be hereby dissolved; and the fracture seemed as if it had never been consolidated."

A case in which bones consolidated after fracture became disunited in the progress of scurvy, is mentioned by Dr. Mead; and not long ago an instance of the same kind was witnessed in a patient in the seaman's hospital, *Dreadnought.* This man, while in China, broke one of his ribs, which united in the usual time; in the voyage home he became scorbutic; the rib which had been broken, became disunited, and was so on his arrival in this country, when he was admitted into the *Dreadnought.* On his recovery from scurvy, the rib speedily united again.

Another symptom, somewhat allied to the preceding, is mentioned by authors as occurring in children and young persons, in advanced stages of scurvy: namely, separation of the epiphyses, from bones. (See *Phil. Trans.* for 1669 and 1670.) No instance in which this occurred has ever fallen under our own notice, and the symptom has not been remarked by naval physicians; a circumstance unquestionably owing to the mature age of the generality of sailors.

Although it is not unusual for ulcers that have been long healed to break out afresh in persons affected with scurvy, there is very little disposition to become ulcerated in parts that have not previously been so. We have often had to treat scorbutic patients, who had been confined to their hammocks six or eight weeks, and during that time had been scarce able to change their posture by reason of the pains occasioned by any attempt to move the legs; but we have never met with an instance, in which sores were produced by lying. We have at present under our care a man who has recently come from the Mauritius, in a vessel in which all the crew were in a dreadful condition from scurvy. On his passage outwards, seven months before he was received into the *Dreadnought*, he became hemiplegic; the paralysis of the arm and leg was complete, and he was quite unable to sit up in bed; his urine and fæces also passed involuntarily. Nothwithstanding all this, he had no sores on the sacrum, hips, or any other part of his body.

In advanced stages of scurvy we have generally found patients much emaciated. This, however, is not always the case; we have even met with an instance, in which, up to the last period of the disease, the patient had experienced no loss of flesh. Loss of flesh is not dwelt on by authors among the symptoms of scurvy. The persons in whom we have observed it were sailors, who had nothing to eat but hard salt beef and ship biscuit, which they could not masticate from the state of their gums. Many of them have assured us that, although hungry, they had often passed the entire day without eating.

Anatomical characters. Notwithstanding the great mortality occasioned by scurvy, and the attention it excited up to the present century among the most distinguished physicians, very little is known of its morbid anatomy. The records that we possess of dissections of persons, dead of this disease, are very few; and in these, the terms in which the state of organs is described are often vague, and leave us in doubt as to the meaning they convey. At the present day scurvy very seldom proves fatal, except at sea, in ill-equipped vessels; so that opportunities of supplying this deficiency in former treatises on scurvy, are extremely rare.*

We have had an opportunity of examining the state of the organs, in three subjects only, who at the time of their death were affected with scurvy. In the first of these instances, the patient, John Rumney, twenty-five years of

* For dissections of subjects who died of scurvy, see *Narrative of Lord Anson's Voyage*; *Phil. Trans.* for 1669; *Dict. des Sc. Médicales*, art. SCORBUT; Rouppé, *De Morbis Navigantium.*

age, died soon after his admission into the *Dreadnought*, simply of scurvy. He had come from the Mauritius in a vessel, in which scurvy prevailed to such a degree, that one half of the men, before the mast, had died of it in their passage homeward, and all the rest were so disabled that, for some time before they arrived in port, the vessel was worked entirely by the officers.

The following were the appearances noticed in an examination made twenty-five hours after death : —

The body was much emaciated; the extremities were rigid; and on the back there was an extremely faint violet stain.

The mucous membrane of the œsophagus was pale and healthy. The stomach was large; its mucous membrane in the splenic extremity was thin and soft, and presented a dark grey stain in lines (apparently folds of the stomach); elsewhere, it was pale, of natural thickness and consistence, not mammellated. The duodenum contained a fluid tinged with a yellow bile; its mucous coat was pale and healthy. The mucous membrane of the small intestines, in all their extent was pale, and had no appreciable alteration in thickness or consistence. Many patches of Peyer's glands were very conspicuous, from being dotted with black points, and of a darker cast than the surrounding membrane; but they had no unnatural thickness or softness. The coats of the jejunum offered, here and there, some dark (blackish) spots, about the size of split peas; the mucous and peritoneal coats, when stripped off, were free from this stain, which was confined to the intervening muscular coat or cellular tissue, and which probably resulted from ecchymoses. There were none of these discolourations in the ileum. The contents of the small intestines were natural.

The large intestine was filled with solid fæces of a light yellow colour. Its mucous surface presented a blackish or dark grey stain in variable degrees; this stain was found to involve the mucous coat, which offered a few small, scattered, and very superficial ulcerations. Some of these ulcerations occupied the centres of stained spots, while others, as well as the surrounding mucous membrane, were perfectly pale. In the lower portion of the large intestine was some viscid mucus (probably resulting from the irritation of scybala), adherent to the mucous coat. The external surface of the large intestine, though in a much less extent than the internal, also presented some blackish stains; these stains were confined to the peritoneal coat, which, on being stripped off, retained this colour. There was no *general* discolouration of the peritoneum; no enlargement of the mesenteric glands; no blood in any portion of the intestinal canal.

The liver was of nutmeg appearance, (colours contrasted, buff and red); of normal consistence, and 3 lbs. 9 oz. avoid. in weight. Liquid blood issued from some large vessels divided by incision. The gall-bladder contained some *yellow* bile of the consistence of thick syrup.

The spleen was soft, of a plum colour, and weighed ten ounces and a half. By squeezing it, the fluid portion made to exude, and a whitish spongy mass, was left. The *pancreas* was perfectly natural; the *parotid* also.

The larynx and trachea contained a white, frothy fluid; their mucous membrane was pale and healthy. Both lungs were united to the pleura costalis by old adhesions, which were infiltrated with serum; and both of them were very pale, and remarkably œdematous. When they were cut into, there was an abundant flow of serum, which could be seen streaming from minute bronchial tubes; these were readily distinguished from the veins, which gave issue to liquid blood. The lower lobes of both lungs, on account of the œdema, gave no crepitus on pressure, but had a tough, doughy feel; there was no softening of their tissue, and all the serum could be squeezed out. The heart was about the size of the fist, and when emptied of its contents, 8 oz. avoid. in weight; it was flabby, and its muscular tissue remarkably pale; the proportions of the cavities were natural, as well as the thickness of their parietes; the valves perfectly healthy; the lining membrane of the heart and of the vessels, pale. In the left auricle was a white, fibrinous clot, which was firm, and of the size

of a nutmeg, with threads which extended into the vessels. In both cavities on the right side were larger white clots with threads; in the left ventricle, only a few small portions of fibrine, entangled in the chordæ tendineæ of the mitral valves. The pericardium, which had its usual polish, contained some ounces of limpid serum.

In the large veins the blood was thin and liquid.

The kidneys were pale but healthy; the weight of each, 6½ oz. A catheter was introduced into the bladder, and some urine drawn off, which was transparent, acid, and free from albumen.

The surface of the brain was very pale, and presented considerable effusion of serum under the arachnoid. When the hemispheres were sliced, the surface of the incisions offered some bloody points; there was no softening of the cerebral substance. The choroid plexuses were very pale, and each lateral ventricle contained some colourless serum. The pectoral muscles were of good colour; the temporal, and the muscles of the thigh, paler then natural. There was no œdema of the legs, no swelling and hardness of the calves, an alteration so frequent in scorbutic persons. On the left tibia was a node-like swelling, which had attracted our attention during the lifetime of the patient. This leg was injected with size, before it was examined; the injection was very successful, the fluid employed returning by the veins, and imparting a vermilion colour to the integument. On cutting down over the tibia, there was found under the fascia, a thin layer of coagulated blood, but no sensible extravasation of the size, and no injection of the clot. On cutting deeper, the periosteum was found to be separated from the bone, for the length of six or seven inches, by solid fibrinous effusion or clot, of chocolate colour, and a line or two in thickness. On the periosteal and osteal surfaces of this clot, there was a slight extravasation of the size, but the clot itself was beautifully injected. Small injected vessels could be seen in the clot by the naked eye, and by aid of a glass they were very manifest. When the periosteum, which was itself thickened and infiltrated with blood, was gently stripped from the clot, many threads were seen to pass from one to the other; these were evidently vessels, and some of them filled with size. On stripping the clot from the bone, some vessels were also seen filled with size, coming from the former, and entering the latter; but the vascular connection of the clot and bone was much less than that of the periosteum and clot. The clot in question surrounded the tibia, with the exception of the ridge on the anterior and outer surface of the bone; on this ridge the periosteum adhered to the bone, but could be readily stripped from it. A few lines beyond the limits of the clot the periosteum was perfectly natural in appearance, and adhered to the bone with its usual firmness.

The bone itself did not appear diseased; it was firm, and resisted the saw as much as usual. The membrane lining the medullary canal was well injected, and the bone itself was injected in a slight degree.

There were other clots separating the periosteum from the bone, on the fibula of the same leg; one on the femur, some on the tibia of the opposite leg.

There was no extravasation of the size that could be detected by the naked eye, on the integument or between the muscles; in fact, none except that already mentioned between the periosteum and bone. The periosteum was separated by a clot from the bone of the lower jaw in its whole extent, except at the attachments of the temporal and pterygoid muscles; at the neck of the bone on each side; and also in a space, about an inch in breadth, inside and out, at the chin. The attachments of the genio-hyo-glossi were preserved; those of the mylo-hyoid on both sides destroyed.* Where the periosteum was detached from the bone, the intervening clot was black, and a line or two in

* Dr. Cook, in a letter to Dr. Lind, describing the scurvy that prevailed in the garrison at Riga, in the spring of 1751, says, " their rotten gums gangrened, as also their lips, which dropped off; the sphacelus spread to their cheeks and the muscles of their lower jaw; and the jaw-bone in some, fell down upon the sternum." (*Lind*, p. 280.)

thickness. A considerable portion of the gum, immediately surrounding the teeth, had sloughed. The bone had a dark stain in a space extending three or four lines from the edges of the alveoli; elsewhere it appeared healthy. There was no caries.

On the upper jaw also the periosteum was separated from the bone by a dark clot, which extended as high as the zygoma.

In portions of the bones of the leg or face, where there were no clots, the periosteum was healthy, and firmly adherent.

There was no effusion between the muscles of the face; no enlargement of the salivary glands. There was a considerable ecchymosis between the muscles covering the abdomen.

In this patient scurvy existed almost without complication. Before its accession, indeed, he had taken mercury, which, perhaps, rendered the state of the gums worse than it would otherwise have been, but which did not modify in any other way the progress of the disease. The great emaciation was probably occasioned by abstinence from food; for some time before his admission to the *Dreadnought*, he had nothing to eat but hard salt beef or pork, and ship biscuit, which, for many weeks, he must have been unable to masticate. To the same cause we may perhaps ascribe the softness and thinness of the mucous membrane in the splenic extremity of the stomach. Œdema of the lungs, and the extreme debility to which he was reduced, seem to have been the immediate cause of death.

After death, the chief morbid appearances, observed in the organs of digestion, were softness and thinness of the mucous coat in the splenic extremity of the stomach; an alteration which the good appetite and the power of digestion, usually possessed by scorbutic persons, would lead us to suppose occurs seldom in scurvy; small, superficial ulcerations of the mucous membrane of the large intestine; and blackish stains in the muscular coat of the jejunum, and in the mucous and peritoneal coats of the large intestine. The comparison of this case, with the two following, renders it very probable that these stains are referrible to the scorbutic habit, and that they resulted from hæmorrhages, the tendency to which is so characteristic of scurvy. It is worthy of remark, that no traces of disease were observable in the mesenteric or salivary glands. The bile, instead of being of its usual olive colour, was *yellow*; it is probable that this alteration in the character of that secretion resulted also from the scorbutic condition, and it may perhaps serve to explain the constipation so often remarked in cases of scurvy, as well as the peculiar cast of complexion in persons affected with this disease.

In the lungs the only morbid change was the œdema, which must have taken place in the last days of life; and, with the exception of paleness and a flabby state of the heart, no appearances of disease were discovered in the central organs of circulation. Nothing was remarked of the state of the blood, except that it was thin and fluid in the large veins. That it was deficient in quantity, at least of red particles, was shown by the faintness of the violet stain on the back at the end of twenty-five hours after death; by the paleness of the muscles, and of the mucous membrane of the intestinal canal in its whole extent, of the mucous membrane of the bronchi, of the pulmonary tissue, of the brain and choroid plexures, and of the kidneys; as well as by the paleness of the tongue, and mucous membrane of the lips, observed during life. The fibrinous clots in the ventricles show, however, that it had not lost the property of coagulating: it is also worthy of remark, that it had imparted no stain to the lining membrane of the heart or vessels. But the most singular fact which this dissection discloses is the presence of clots between the periosteum and bones of the jaws and lower extremities. Painful nodes on the tibiæ, and swellings along the lower jaw, have been mentioned by many writers as symptoms of common occurrence in advanced stages of scurvy; but we are not aware that the cause of them has ever before been ascertained. The persistence of the vascular connexion of the periosteum with the bone, through the clot, renders

it probable that the effusion took place very gradually, and serves also to explain the circumstance, noticed by Dr. Lind, that, although scorbutic nodes continue a long time on the tibiæ, they never give rise to exfoliation of bone. The fact that, notwithstanding the force used in injecting the leg, there was no extravasation of the size, that could be detected by the naked eye, on the integument, in the subcutaneous cellular tissue, or betwen the muscles, affords an argument in support of the opinion that the hæmorrhages in scurvy result more from a change in the blood than from weakness of minute vessels.

In the second fatal case the patient, æt. 23, was admitted into the *Dreadnought*, immediately on his arrival from Calcutta, and was affected with albuminous dropsy, as well as with scurvy. At the time of his admission his legs were sprinkled with petechial spots, and his gums formed a black, spongy mass, which completely concealed the teeth. He was tapped two days after his admission, and three gallons and a half of serous fluid, slightly tinged with blood, were drawn off. This produced temporary amendment, but at the end of some days inflammation of the pleura supervened, and he died a fortnight after his arrival in this country. The following notes were taken of the morbid appearances. The body was very œdematous. In the cellular tissue, under the lower portion of the great pectoral muscle on the left side, and above the ribs, there was an infiltration of pus which had no communication with the pleura.

The lower lobe of the left lung was united to the pleura costalis and diaphragm by very soft adhesions; the false membranes that formed these adhesions were imbued with pus, and the pleural cavity contained a considerable quantity of turbid serum. The pleura costalis presented a mottled rosy appearance: the lung itself was healthy. The cellular tissue over the pericardium was infiltrated with pus. The pericardium contained a small quantity of serum, and had its usual polish, except on the surface of the heart, where there were a few thin shreds of false membrane.

The heart was natural in size; the parietes of the left ventricle thickened; in other respects it was normal. The valves were quite healthy.

The right lung was healthy, but somewhat compressed by a considerable quantity of colourless serum in the pleural cavity.

There was no appearance of inflammation about the puncture made by tapping. The intestines, which (especially the large) were much inflated, presented on the outside a blackish green, or dark olive tint. The peritoneal coat, when stripped off, was almost uniformly of this colour. The mucous membrane of the stomach presented in the splenic extremity, a similar dark green colour, in spots about the size of pins' heads. In the pyloric extremity, which did not offer this colour, there was a bright blood-red mottling, which resembled in every thing but colour the mottling in the splenic extremity. The mucous membrane of the small intestines appeared as if sprinkled with a fine dark green powder; the coloured points were in the villi. There was nowhere any change in the consistence of the mucous coat.

The liver was large, and its convex surface presented some ecchymoses; its tissue was pale, and both colours blended.

The spleen was natural in size, and readily broke into a pulp under the finger; the pancreas, natural.

The kidneys were large, and lobulated externally. The cortical substance, of a dull white, contrasted strongly with the medullary, which was of a pale pink colour.

In this case there was a general discolouration of the peritoneum, like that observed in patches on the large intestine in the case of Rumney. The dark green spots on the mucous membrane of the stomach and small intestines were also unquestionably analogous to the stains in the mucous membrane of the large intestine of Rumney. The blood-red mottling in the pyloric extremity of the stomach, which resembled in every thing but colour the mottling in the splenic extremity, goes to prove that the latter was of the same character with the former, but of earlier date. The presence of pus in the cellular tissue and

on the pleura shows that, although acute inflammations seldom occur in scurvy, the scorbutic habit is not incompatible with the existence of inflammation in its highest degree, and does not prevent the formation of its usual products.

The dropsy and albuminous urine in this case are undoubtedly referrible to disease of the kidneys. It is worthy of remark that, notwithstanding the great tendency to hæmorrhage in scurvy, we have never met with an instance in which blood was observed in the urine; and in more than twenty cases of scurvy we have tested the urine by heat and nitric acid, without finding it albuminous in a single instance, except in the case of Williams.

There was a circumstance noticed in this case which shows the specialty of the morbid changes which constitute scurvy. We allude to the improvement in the state of the gums in Williams, after he was liberally supplied with oranges. This improvement, notwithstanding his general condition, was as rapid as we have ever witnessed it.

In the third fatal case, the patient aged sixty, had been twenty-one years in India, a soldier in the Company's army. His health had been somewhat impaired for two or three years before he left India; and soon after he entered on his homeward voyage he became affected with scurvy in a high degree. He had a very severe rigour, and died, apparently from exhaustion, soon after he arrived in this country.

Inspection six hours after death. The body was of a dusky olive colour; of robust figure, and not emaciated. The skin of the extremities sprinkled with black spots, some of them as large as a shilling, which were found to depend on coagulated blood. The muscles unusually pale.

The lungs were remarkably bloodless, and very much collapsed, presenting no trace of disease. The heart was very large; the right cavities were much dilated, without hypertrophy, and contained soft fibrinous coagula; the left ventricle was thickened, its cavity not dilated. The pericardium and valves, as well as the aorta, were quite healthy.

The mucous membrane of the stomach was of a rosy tint The small intestines, which were much contracted, were very pale, and offered here and there a small ecchymosis under the peritoneal coat. The large intestine was so contracted as scarcely to admit the finger; its mucous membrane was much thickened, and everywhere of a strawberry tint, except in the cæcum where it was of a mottled olive colour. There was no ulceration in any part of the intestine.

The liver was large, and very friable. The gall-bladder was much distended by a yellow, ochry fluid; and contained also eight calculi, about the size of small peas, of dark olive colour, and all regular tetrahedrons in figure.

The spleen was large, and broke into a pulp under the finger; its capsule was readily stripped off.

The kidneys were pale; in other respects normal. The urinary bladder contracted.

There was a great quantity of transparent serum under the arachnoid, and in the ventricles; the cerebral substance was pale, in other respects normal. Thin fluid blood escaped when the large vessels in the neck were divided.

In this case the mucous membrane of the cæcum presented the same mottled olive colour that we have noticed in the dissections in the former cases. The origin of this colour is also indicated in this case by the strawberry tint of the mucous membrane in the remaining portion of the large intestine, and by the ecchymoses under the peritoneal coat of the small intestines.

The contents of the large intestine were not noticed. The manner of his death, and the state of the large intestine, render it probable that intestinal hæmorrhage had taken place.

The condition of the liver, and the contraction of the colon with thickness of its coats, serve to explain the impaired state of the patient's health before he left India.

The general inferences to be drawn from the preceding facts are, that in the *inspection* of the bodies of persons who die of scurvy, the chief indications

of that disease are met with in the colour of the skin, in the state of the gums, and in the presence of fibrinous effusions, and of ecchymoses or effusions of blood. These effusions occur most frequently in the skin, in the subcutaneous cellular tissue, and between the muscles of the lower extremities *; between the periosteum and bones of the lower extremities and of the jaws; and in the peritoneal coat, and in the muscular and mucous coats of the intestinal canal. The numerous traces of hæmorrhage observed in the coats of the intestines are in accordance with the frequency with which scorbutic persons pass blood by stool.

The change observed in the complexion is referrible to the state of the blood; and we have already mentioned a fact which supports the opinion that the hæmorrhages also mainly depend on the same cause. Our observations, however, furnish us with no direct information respecting that fluid, except that it is deficient in red particles; that it has not lost the property of coagulating; and that it does not impart a stain to the lining membrane of the heart or vessels. †

Beyond a general paleness of tissue, there is no change characteristic of scurvy observable in the brain; in the organs of respiration; in the heart or large vessels; in the glandular system (except perhaps in some of the secretions); or in the bones.

The cases which have been recorded of the disunion, during the progress of scurvy, of bones which had been consolidated after fracture, and the separation of the epiphyses from the bones, mentioned by authors as sometimes occurring in young persons affected with this disease, seem indeed, to lead to the opinion that the bones themselves may become affected in scurvy. A case, however, lately published by Dr. Godechen, of a scorbutic patient who died in 1834, in the marine hospital at St. Petersburgh, serves to explain the process by which the disunion and the separation in question are effected. During the lifetime of this patient it was observed that some of his ribs were dislocated from their cartilages, and that several others were fractured near their anterior extremities. These fractures occurred without violence, some of them even during his stay in the hospital. Examination of the fractured ribs, after death, proved that the periosteum was stripped from their bodies to the extent of half an inch on each side of the seat of fracture; and that a sort of pouch, which was filled with soft dark-red coagulum, containing small fragments of bone, had been formed around the fractured extremities of each bone. The surfaces of the fracture were rough, but not splintered; and the neighbouring costal pleura presented no appearance of inflammation. At those spots where separation of the cartilages from the ribs had taken place, like changes had occurred; the extremities of the cartilages being further softened, but neither remarkably rough nor thickened. ‡

Although it is not so stated in the account given of this case, we have little doubt that the ribs of this patient had been fractured at some former period, and that, as in a case we have already mentioned, and also in the one recorded by Dr. Mead, a disunion of the consolidated fractures took place in the progress of scurvy. The process seems to be, effusion of blood between the periosteum and bone, and consequent destruction of the vessels which serve to nourish the bone.

Such are the morbid changes which we discover by dissection in the bodies of those who die of scurvy. They are in themselves interesting, but we arrive at much more important information respecting the nature of this disease, by consideration of the circumstances detailed in former chapters. When we reflect that the exclusive cause of scurvy, is prolonged abstinence from the

* The greater frequency of effusions of blood in the lower extremities, is probably owing to gravity.

† This confutes an opinion, expressed by an eminent physiologist, that in scurvy the globules of the blood are dissolved in the serum. (See *Müller's Physiol. Trans.* p. 257.)

‡ See a notice of this case, (which was originally published in *Zeitschrift für die gesammte Medizin*, band vi. heft i.), in the *British and Foreign Medical Review*

juices of succulent plants and fruits; that by the use of these it may always be prevented; and that, when it exists even in its highest degree, it may be speedily cured by the same means, the inference is plain, that these juices contain some element essential to the formation of healthy blood; and the history of scurvy shows that they cannot be replaced by any of the other elementary nutritive substances from the vegetable kingdom; such as starch, mucilage, oils, albumen, gluten; or by any of the elementary nutritive substances of animal origin. The powers of digestion in scurvy are not impaired, but the materials on which they act are deficient in necessary constituents, and the blood formed from them is imperfect. This imperfection of the blood is the source of all the symptoms, and the cause of all the morbid anatomical changes which are observed in scurvy. We have already considered at great length the variety and serious nature of the former, and the peculiar character of the latter. The study of scurvy is, therefore, most instructive to the pathologist, showing as it does the variety and importance of the effects which may result from a primary alteration in the quality of the blood, independently of any morbid change in the solids. The history of its treatment further shows how quickly that fluid may be restored to a healthy state, when its morbid quality does not depend on any vitiation by poison, but simply on a defective supply of some of the elements necessary for its formation.

The exact difference between the composition of healthy blood and that of the blood in scurvy is not known to us by direct experiments; but the reality of a change in the blood in scurvy, proved as it is by the foregoing considerations, is sufficiently attested also by the pallid dingy hue of the complexion, by the state of ulcers, and by the frequency of spontaneous hæmorrhages.* The general paleness of the tissues shows that there is great deficiency of red particles, and the tendency to swoon, so constant in scurvy, is undoubtedly owing in some measure to this deficiency, for physiologists have shown that the vivifying influence of the blood resides chiefly in these particles. It is evident,

* Since this paper has been in the hands of the printer, my friend Mr. Busk has made for me an analysis of the blood in three well marked cases of scurvy. The result of this analysis, which was performed in the manner recommended by Dr. Christison, in his work on granular kidney, is given in the subjoined table. The fourth horizontal line in this table, is introduced for the sake of comparison, and gives the analysis, by the same method, of blood taken from a robust sailor, who had slight psoriasis, but was otherwise in good health. This analysis of scurvy blood, although it does not enable us to say what is the peculiar change of the blood in scurvy, is sufficient to disprove the prevalent notion that in this disease the globules are dissolved in the serum. In the blood taken from these scorbutic patients, the separation into serum and clot was as perfect, and took place as rapidly as in healthy blood. The same fact has been noticed by Rouppé, in his work, *De Morbis Navigantium*. *Trans*. p. 180.

Case.	Age.	Serum. Appearance.	Serum. Specific gravity.	Clot.
1	27	Pale straw colour.	1·028	Small, firm, buffed, and cupped.
2	33	Ditto.	Not ascertained.	Large.
3	23	Yellow, hazy.	1·025	Small, firm, buffed, and cupped.
4	45	Yellow, straw colour.		Large, sizy.

In 1000 parts.				
Water.	Hematosine.	Fibrine.	Albumen.	Salts.
849·9	47·8	6·5	84·0	9·5
835·9	72·3	4·5	76·6	11·5
846·2	60·7	5·9	74·2	10·9
788·8	133·7	3·3	67·2	6·8

however, that diminished proportion of red particles, which is common to many diseases, is not the only nor the most important change of the blood in scurvy.

The cause of scurvy suggests considerations scarcely less interesting than those which arise from a study of its pathology. We here learn the great importance of considering food, not only in reference to digestibility and other qualities, but also as the material from which healthy blood is to be formed. We are of opinion that this point of view is too often overlooked, both as regards public health, and in prescribing diet in individual cases, and we hope these pages may call anew the attention of physicians to this interesting subject. We have seen that the approach of scurvy is gradual, and that prolonged abstinence from succulent vegetables is necessary for its full development; but it is our opinion that something short of this — that a condition which might be correctly designated a scorbutic taint — must often occur in the lower classes in towns, but especially in prisons and asylums, towards and at the close of long winters, when succulent vegetables are scarce and expensive. Such a condition of the system would necessarily modify the character and course of supervening acute diseases; and it is worthy of the most diligent inquiry whether that form of scarlatina, designated by the epithet *maligna*, and analogous types of other eruptive diseases, may not, in some cases, owe their peculiar aspect and character to the circumstance of a scorbutic taint already existing, when the system becomes subject to the specific poison of these several diseases.*

It appears to us, also, that by the common practice of physicians in many chronic diseases, patients are kept far too long a time on a diet consisting of farinaceous food, or of this with some proportion of animal food. When a moderate use of succulent vegetables is considered prejudicial, it would be advisable to supply the patient with their equivalent, namely, a certain proportion of orange or lemon juice. †

Physiologists have made experiments on animals to ascertain the effect of a diet composed of substances devoid of nitrogen. The condition of the system which this brings on is different from scurvy, and of far more serious nature. It appears from the experiments of Magendie, that after an animal has been kept a certain time on such a diet, the allowing him his customary food does not save him. ‡ The contrary is notoriously the case in scurvy, which, as far as we can judge, does no permanent injury to the constitution.

Diagnosis. The history of scurvy shows, more completely than that of any other disease, the great practical importance of accurate diagnosis. It was owing to want of it, that scurvy continued to prevail, to a most fatal extent, for two centuries after effectual preventives and remedies had been discovered in the most abundant productions of nature. We have already mentioned that in the earliest accounts of the disease by Ecthius, Rousseus, and Wierus, who wrote in the first half of the sixteenth century, there is not only an accurate

* A fact which renders this probable is, that these types prevail most, during and at the close of long winters. We may here notice the extraordinary prevalence of typhus in the severe winter of 1837, 1838, and the petechial character of that epidemic. Sir. G Blane has remarked, that the low spotted typhus is always most prevalent in long and severe winters. Willan states also, that the malignant form of scarlatina is usually limited to the winter months. The following paragraph from Huxham's *Essay on Small-pox*, may also bear on this subject: "I have never observed either the *vegetable* or *mineral acids* of any great service in the crude crystalline pox, but I have often found them highly useful in the *small, black, confluent kind, with petechiæ*."

† On the 28th of May, of the present year, a patient was admitted into the *Dreadnought*, presenting the usual symptoms of scurvy. He entered a hospital in Scotland, on the 15th of the preceding November, on account of an injury on the leg, received the same day, and continued there till the 22d of May. During this period, he lived chiefly on oatmeal-porridge with milk; but latterly he had four ounces of meat, which he ate with bread, and three ounces of whisky daily. Occasionally he had broth without kale. No potatoes or other vegetables; no beer. The scorbutic symptoms disappeared in a few days, under the free use of lemon juice.

‡ The reader who is desirous of further information on this point, may compare the account of these experiments of Magendie with the description given by Mr. Malcolmson, of the effect produced by a diet of bread and water on the health of prisoners in India. (*Letter on Solitary Confinement*, &c.: by J. G. Malcolmson, Esq.)

description of its symptoms, but an enumeration of many of the vegetables and fruits which at present are the most distinguished for antiscorbutic properties. In the early part of the seventeenth century, however, a work on scurvy was published by Eugalenus, a Dutch physician, who laboured to prove that almost all cutaneous diseases, hypochondriasis, and various other maladies, were merely different manifestations of the scorbutic diathesis, and ought to be considered as one disease. The confusion was made still greater by subsequent writers, until at last physicians had comprehended under the term scurvy, almost every distemper incident to man. Sydenham tells us that, in his time, scurvy and malignity were the subterfuges of ignorant physicians; and Willis, writing in 1769, could make use of such expressions as these:—"Si accidens quoddam inusitatum nec prius auditum in corpore humano eveniat, cum ad aliud certum genus referri nequit, sine dubio statim illud *scorbuticum* pronuntiamus." (*Willis, De Scorbuto*, cap. i. p. 14.)

In the middle of last century Dr. Lind complained much of the same want of accurate diagnosis, and dwelt very impressively on the evils that resulted from it. (*Lind*, preliminary discourse, ch. iii.) It is to this author, who, as physician to the fleet, was well placed for observing the uniformity of the disease, that we are indebted for the final dispersion of most of the errors that prevailed on this subject. His patient investigation of the history of scurvy will ensure him the rank of a philosophic physician; while his perseverance in forcing on the public notice the means by which it might be prevented, and the beneficial influence which the adoption of these means has had on the condition of a numerous and important class of our fellow-subjects, will ever entitle him to a high place among the benefactors of mankind.

At present, the subject of diagnosis is comprised within very narrow limits. The only disease with which scurvy can be confounded, is purpura. This term, in the language of modern pathologists, is intended to include every variety of petechial eruption, or of spontaneous ecchymosis (see *Bateman* and *Biett*); it consequently comprehends typhus, or petechial fever, scurvy, and probably other distinct diseases, which, until we have learned to discriminate between them, we are compelled to group under the generic term, Purpura. Petechial fever, indeed, is easily distinguished by the peculiar character of its symptoms from the other diseases, which, by the preceding definition, are included in the same class; but scurvy, and the maladies to which we would restrict the term purpura, are confounded by the best writers on diseases of the skin. They are, however, essentially different; they arise from different causes; they differ in the circumstances and mode of attack; and they require different treatment. We have already stated that the essential cause of scurvy is prolonged abstinence from vegetable juices, and that the approach of the scorbutic habit is very gradual: purpura, on the contrary, often appears suddenly, and in many cases it cannot be attributed to any peculiarity in diet. Scurvy, when occurring on land, is, from circumstances we have before mentioned, met with almost exclusively at the end of winter, or in the early part of spring; purpura, on the other hand, is most common in summer and autumn. The livid and spongy state of the gums, which is pathognomonic of scurvy, and which, as well as the sallow and dusky hue of the skin, is a constant symptom of that disease, is not observed in purpura. Lastly, in scurvy, bleeding always does harm, and the disease is speedily cured by the use of succulent vegetables and fruits; while, in purpura, the abstraction of blood is often followed by relief, and the antiscorbutic juices are rarely, if ever, productive of much benefit.*

It has been supposed that there are varieties of scurvy, and that scurvy occurring on land is different from that which arises at sea. If, however, we

* This circumstance alone is quite sufficient to prove an essential difference between scurvy and the diseases to which we would limit the term Purpura. The effect of vegetable juices is so constant and so specific in real scurvy, that we may safely infer that a disease not benefitted by them, is of essentially different nature.

compare the descriptions given by the early writers * on scurvy, who observed it on land, or the cases recorded by Dr. Heberden, with the accounts of naval physicians, we shall perceive an entire agreement in the essential symptoms of the disease. Moreover, it is easy to see that the disease depending, as it does, on a single cause, must be identical wherever it occurs.

Treatment. After the details into which we have entered respecting the causes and prevention of scurvy, we have little to say on the subject of treatment. The essential point is to administer liberally those articles of vegetable food, which have been distinguished for their antiscorbutic qualities. Oranges, lemons, or fruits of that class, if they can be procured, should be preferred. Their salutary effect is extraordinary, and such as would scarcely be imagined by persons who have not witnessed it. In the course of a few days, the complexion loses its sallow and dusky hue; the gums become firm and florid; the petechiæ and bruise marks on the skin disappear; the legs, if swollen and rigid, begin to regain their natural size and pliancy; despondency and muscular weakness are replaced by cheerfulness and a feeling of strength:— in fact, the aspect and condition of the patient soon betoken return of health.

If the state of the gums be such as to prevent the patient from masticating, he should be kept for two or three days on milk diet †, or on soups, in addition to antiscorbutics. At the end of this time, or at the commencement, if the case be less severe, his diet should consist of fresh animal food, with vegetables, especially in the form of salads. As long as he continues very feeble, wine should be freely given him; afterwards, this may be replaced by porter or ale.

In advanced stages of the disease, when debility is extreme, and the slightest exertion produces fainting, the patient should not be exposed to sudden change of air, or be even allowed to sit up in bed without great caution. Before he is moved or permitted to get up, a glass of generous wine, well acidulated with lemon or orange juice, should be given him. This injunction was first made by Dr. Lind, and we have more than once had to regret not having obeyed it.

Sleep should be procured by an opiate at night, which we have often found to produce great comfort.

Constipation, when it exists, may be removed by mild purgatives; and for this purpose none are preferable to moderate doses of castor oil. On account of the great debility, and the tendency to swoon, which in high degrees of scurvy is sufficient to cause alarm, all strong cathartics should be avoided. For the gums we may prescribe an astringent gargle; and none answers better than a weak solution of chloride of lime. For scorbutic ulcers, the best dressing is lint soaked in lemon or lime juice, diluted with two or three times its quantity of water. (*Dis. of Seamen*, p. 468.) The lint when placed on the ulcer, should be covered with oiled silk to prevent evaporation. Firm compression should be avoided, from the tendency it has to produce gangrene. If the legs be much swelled, stiff and painful, considerable relief will be procured by warm fomentations.

But all these complaints yield readily to the general method of cure, and can only be palliated until that is undergone. Bleeding should never be had recourse to, although acute pains, heat of skin, quickness of pulse, and other febrile symptoms or a dangerous hæmorrhage may seem to render it advisable. In advanced stages of the disease patients do not survive it. (*Lind*, p. 216). Blisters are apt to produce gangrene, and for this reason we should abstain from their employment. (*Larrey*, *Mém de Chir. Mil.* tom. ii. p. 288.)

Mercury, in every form, should be religiously avoided: even in very small quantities it has been known to produce dangerous salivation. We have met with instances in which the scorbutic symptoms seemed to have been much

* Ecthius, Wierus, or in fact, any writer before the time of Eugalenus. See also *Med. Gazette*, vol. xx. report of Dr. Murray.

† We have no evidence showing that milk is antiscorbutic. Dr. Lind mentions, on the authority of Sinopæus, that scurvy is common among the Tartars, who live chiefly on milk and flesh (*Lind*, p. 246.); and we have already noticed its occurrence in the Lunatic Asylum at Moorshedabad, in which milk was regularly supplied to the inmates.

aggravated by mercury taken before the scurvy made its appearance. The ill effects of this medicine are indeed noticed by most writers on scurvy; and Kramer, who was physician to the imperial armies in Hungary, from 1720 to 1730, relates that of 400 men, affected with genuine scurvy, to whom, on the advice of Boerhaäve, mercury was given so as to induce salivation, not one survived.

In the writings of the physician whose testimony we have just given, is a passage which expresses so pithily and so truly almost all that we can say on the subject of treatment, that we cannot refrain from quoting it. "Scurvy is the most loathsome disease in nature; for there is no cure for it in your medicine chest; no, nor in the best furnished apothecary's shop. Pharmacy gives no relief, surgery as little. Beware of bleeding: shun mercury as poison: you may rub the gums, you may grease the rigid tendons in the ham, to little purpose. But if you can get green vegetables; if you can prepare sufficient quantity of fresh, noble, antiscorbutic juices; if you have oranges, lemons, or citrons; or their pulp and juice preserved with sugar in casks so that you can make lemonade, or rather give to the quantity of three or four ounces of their juice in whey, you will, without other assistance, cure this dreadful evil." (*Krameri, Medicina Castrensis.*)

DROPSY.

General Doctrines of Dropsy.

Conditions of the system under which dropsical effusions arise. — General pathology of dropsy. — Chemical composition of dropsical fluids. — Remarks on some of the phenomena of the effusion. — Prognosis of dropsy. — General principles of treatment. — Cardiac Dropsy. — Indications that dropsy originates in cardiac disease. — Forms of cardiac disease that induce it, and progress of the dropsical effusion. — Renal Dropsy. — Peculiar characteristics of this form. — Appearances in the structure of the kidney in renal dropsy. — Relation of renal disease to dropsy. — Condition of the urine — of the blood. — Incidental complications. — Causes of the renal disorganisation. — Acute or Febrile Dropsy. — Nature, symptoms, and causes. — Dropsy following scarlet fever. — Treatment of general dropsy — of acute or febrile dropsy — of chronic general dropsy — of the renal form of chronic general dropsy — of cardiac dropsy — of diet and drinks.

Dropsy, strictly defined, consists in the accumulation of a preternatural quantity of watery or serous liquid in some one or more of the natural serous cavities of the body, or in the interstices of the serous cellular tissue; independently of inflammation of the boundaries of those parts.

But the term dropsy has likewise been applied to collections of serous or other liquids in *cysts:* that is, in cavities which are themselves preternatural, which have been formed, or greatly enlarged and altered, by some morbid process.

Serous effusions into the circumscribed cavities of the body are often the immediate results of inflammation of the internal surface of the cavity; and these also have sometimes, though inexactly, been denominated dropsies. They will be no further noticed in the following dissertation than may be necessary for better understanding and discriminating the watery accumulations that are more properly accounted dropsical. Nor is every collection of serous liquid found in the shut cavities of the dead body, and independent of inflammation, to be considered a dropsy. If the liquid does not exceed a certain measure, and especially if the examination of the corpse has been delayed, as is customary in this country, till twenty-four or thirty-six hours after death, the effusion must not be regarded as a morbid appearance, or as affording any evidence of previous disease. It is a purely physical phenomenon. As vitality ceases the blood accumulates, and ultimately stagnates, in the venous system; the tissues of which the veins are composed become loose and more permeable than during life, in consequence of commencing decomposition; and the serous part of the blood transudes mechanically through them with greater facility than before.

It has been said, and said with much truth, that dropsy is rather a symptom of disease, than a disease in itself; and that it would therefore be more philosophical to treat of the original malady on which the accumulated water depends, and to withdraw dropsy altogether from the number of substantive diseases. But the propriety of still regarding dropsies as constituting a genus of disease, and particular dropsies as specific forms of disease, may be defended by the following considerations:—

1. Allowing that dropsy is often, or always, a symptom, it is a symptom which, in many instances, we cannot trace home, while our patient is yet alive, to its antecedent morbid action, nor satisfactorily ascribe to any organic change discoverable after he is dead.

Practically speaking, in such cases the dropsy is the disease, and the sole

object of our treatment. Moreover, the liquid accumulation is a symptom very obvious and striking in itself, while it results from various physical alterations, differing both in their seat and in their nature; and it will be useful to study dropsies collectively, if it be only with the view of analysing them, and of referring them, as often and exactly as possible, to the pre-existent disease.

Dropsy is, in fact, to a medical eye, in all cases, something more than an effect or symptom of disease. The fluid collection itself is a cause of various other symptoms (συμπτωματος συμπτωματα); of symptoms which often constitute the greater part, or the whole, of the patient's distress and danger. The imprisoned liquid by its weight or pressure may embarrass important functions, or even extinguish life. The removal of the dropsy will frequently restore the patient at once to comparative comfort; or indeed to what, so far as his sensations, and powers, and belief are concerned, is for the time to him a state of health; although the original bodily cause of which the dropsy was a symptom may remain behind, untouched, to be again productive of similar consequences, under circumstances favourable to its operation.

Sometimes it happens that the bodily change, which is the immediate cause of the dropsy, is slight, or temporary; while the patient's comfort, and very existence, are compromised by the mere accumulation of the water: and if this accumulation can be remedied by art, its temporary producing cause may cease, or be removed, or admit of compensation, and so the patient may be strictly restored to sound health.

In a dropsical person, then, whose dropsy results from organic disease, there are plainly two sets of symptoms to be distinguished; namely, those which depend upon the primary disease, and those which are caused by the collection of water. And these two sets of symptoms differ perhaps not only in their gravity and importance, but also in their obedience to treatment. The latter, usually the most grievous, may often be got rid of; the former are frequently but little complained of or felt by the patient, but they are generally permanent.

Dropsy would perhaps be thought, by many, a more attractive subject if it were not so commonly considered incurable. But the preceding remarks may suffice to show that, as far as itself is concerned, it often is curable; and some of its forms will hereafter appear to be curable in a more absolute sense, the serous collection, and the condition from which it proceeds, both admitting of remedy.

Besides, it is our business and aim to cure when we can; and whether we can cure or not, to remove or mitigate human suffering: and this we are able to do, to a very considerable extent, in many or in most cases of dropsy.

Wherever there is a shut sac, or wherever there is loose and permeable cellular tissue, there we may have dropsy. Thus there may be dropsy of the ventricles of the brain, or of the meshes of the pia mater, producing death by *coma*; of the cellular tissue of the lungs, or of the submucous tissue of the larynx, both leading to death by *apnœa*; of the pericardium, causing death by *syncope*. Almost every mode of dying, therefore, may result from dropsical accumulations.

When the cerebral ventricles are distended with water, we express the diseased condition by the term *hydrocephalus*. When serous fluid occupies the pleura, or the pericardium, we say the patient has *hydrothorax*, or *hydropericardium*. If the cavity of the peritoneum be the seat of the collected water, we call the complaint *ascites*. When the cellular tissue of a part becomes infiltered with serous liquid, the part is said to be *œdematous*; and *anasarca* is the name given to the more or less general collection of serum in the cellular tissue throughout the body, and especially to visible subcutaneous œdema of much extent. Under the term *general dropsy* we signify the simultaneous existence of anasarca, and of dropsy of one or more of the larger serous cavities.

Certain forms of dropsy—for example, dropsy of the tunica vaginalis testis, or *hydrocele*, dropsy of the joints and bursæ, *hydrarthrus*, belong to surgery, and need only to be glanced at for the sake of elucidating the general subject.

Upon the whole, dropsies are common and afflicting diseases: they depend upon various conditions, and require a diversity of treatment; and whatever light can be obtained respecting their nature, and causes, and remedies, must be interesting to the physician, and serviceable to mankind. Our present object will be carefully to reduce this large and complicated subject into such order and compass as we can, and to bring the exposition of its facts and doctrines to the present level of medical science.

The first inquiry that naturally arises from the contemplation of this form of disease, is — under what conditions, and by what mechanism, do the hollows and interstices of the body become thus filled and oppressed with water? In one word, what is the general pathology of dropsy? It is an ultimate fact, that from all the surfaces of the healthy living body there is continually going on a kind of secretion, or an oozing forth of fluids. The inner surfaces of the shut cavities, and the partitions of the cells of the cellular tissue, furnish no exceptions to this law. If we examine the interior of an animal just slaughtered, or observe a cavity laid open in the human body by accidental injury, we find any of these inner surfaces *moist*, we may see the fluid escape into the colder atmosphere in the form of vapour. We perceive, also, that the surface is merely moist: the fluid in these shut cavities, during life and health, is taken back again into the circulating blood as fast as it exudes; the two processes of exhalation and absorption are accurately balanced. The disturbance of this equilibrium would account for dropsy.

Now considering the matter hypothetically, we perceive that the balance may be deranged, and the dropsy arise, in one or both of the two following ways. Either the quantity of fluid exhaled may be over-abundant; or the amount of absorption may be deficient; or both these deviations from the natural state may occur together. It is obvious, that dropsy will ensue whenever the exhalation takes place faster than the absorption; and this may happen when both are in excess, or both defective. The inquiry may be reduced, however, in the first instance, to these two questions. Is there ever a preternatural amount of exhalation? Is there ever defect of the natural absorption? An affirmative answer to either question would *explain* the occurrence of dropsy. So, *à fortiori*, would an affirmative answer to both.

These inquiries being satisfied, another point would require to be investigated; namely, whether the product of the exhaling process may not be liable to variation in quality as well as in amount? Whether the liquid actually accumulated in dropsy is essentially identical with the liquid naturally exhaled? Are there, then, any known facts which accord with the hypothesis of a preternatural exhalation or pouring out of the serous liquid? There are, and in order to appreciate them, it will be necessary to bear in mind some further physiological truths. Reference has already been made to the perpetual separation of watery fluid from all the surfaces of the body; the external, and those which communicate with the air, as well as the inner faces of closed cavities. The fluids that exhale from the former class of surfaces are, for the most part, excretions. They are thrown out of the system, and with respect to these, something more has been ascertained. It is observable, that when the escape of aqueous fluid from one such external surface is checked, exhalation becomes more copious from some other excreting surface, or organ. And there are special sympathies of this kind established between certain secreting parts. It is probable that, so long as other circumstances remain the same, the aggregate amount of water thus expelled from the system cannot vary much, in either direction, without detriment to the individual, manifested by symptoms. But we are sure that the quantity furnished by each secreting surface may vary and oscillate within certain limits consistent with health,

provided that the defect or excess be compensated by an increase or diminution of the ordinary expenditure of watery liquid through some other channel. Sound health admits and requires this shifting and counterpoise of work between the organs destined to remove aqueous fluid from the body. The sympathy, or compensating relation here spoken of, is more conspicuous in regard to some parts than others. The reciprocal but inverse accommodation of function that subsists between the skin and the kidneys affords the strongest and the most familiar example. In the warm weather of summer, when the perspiration is abundant, the urine is proportionally concentrated and scanty. On the other hand, during winter, when the cutaneous transpiration is checked by the operation of external cold, the flow of dilute water from the kidneys is strikingly augmented. All this is well known to be compatible with the maintenance of the most perfect health. But supposing the exhalation from one of these surfaces to cease or to be diminished, without a corresponding increase of function in the related organ, or in any organ communicating with the exterior, then dropsy, in some form or degree, is very apt to arise. The aqueous liquid, thus detained in the blood-vessels, seeks, and at length finds some unnatural and inward vent, and is poured forth into the cellular tissue, or into the cavities bounded by the serous membranes.

Cases like the following are common: — a labourer is employed in some work that requires considerable bodily exertion, and he perspires profusely. But the nature of his employment exposes him also to the influence of external cold and moisture; he is digging in a wet ditch, perhaps, in winter. He suspends his efforts for a short time — the perspiration is suddenly checked — the kidneys fail to take on the office of a safety-valve — he becomes universally anasarcous.

A child recovering from scarlet fever ventures out into a cold atmosphere while the process of desquamation is yet going on, and the surface is unusually tender and sensitive; he is soon after attacked with dropsy of the cellular tissue, and, it may be, of other parts also. Doubtless in some of these cases inflammation takes place; but in many of them there is merely the dropsical effusion, without any other trace or evidence of inflammatory action. The two facts which it chiefly concerns us to remark are these, 1. that the aqueous portion of the blood, which, in health, is habitually carried off, to a very considerable amount, by the skin, is suddenly diverted from that tissue, the perspiration, sensible and insensible, is suppressed; and 2. that the cellular tissue, or the shut serous cavities, or both, become filled with serosity. It more commonly happens, indeed, that the intercepted perspiration escapes, or labours to escape, from some other free surface. Diarrhœa, for example, is more frequent, under the supposed circumstances, than dropsy; apparently because there is a closer analogy of structure, and a more direct consent or agreement in function, and a stronger reciprocal influence between the skin and the mucous membrane of the alimentary canal, than between the skin and the serous tissues.

Dropsy of one part sometimes suddenly supervenes upon the rapid disappearance of watery collections from another part. It is no uncommon thing to see the swollen unwieldy legs and thighs of an anasarcous patient quickly unload themselves, and resume their natural bulk and symmetry. His friends congratulate him, and each other, that his disease is leaving him; but as his legs are emptying, he becomes drowsy and stupid, comatose, apoplectic; and after his death, we find the ventricles of the brain distended with serous fluid.

A man aged about fifty was admitted into La Charité in 1819, presenting, in a well marked manner, the local and general symptoms of organic disease of the heart. He had anasarca and ascites to a considerable extent. One morning he was found completely unconscious, with fixed eyes, a pale face, and an open mouth. His limbs, when raised, fell down again by their weight, like dead limbs. Very slight traces of sensibility of the surface remained, the muscles of the face contracting a little when the skin was strongly

pinched. The evening before, this patient was in the full possession of his muscular and intellectual powers. The abdomen, which had been very prominent twenty-four hours previously, had subsided much, and fluctuation in it could no longer be perceived; the limbs were also sensibly diminished in bulk. Death took place in a few hours.

There was not a vestige of cerebral hæmorrhage; but the surface of the brain gave to the touch a sensation of obscure fluctuation. This became more distinct, as the upper part of the hemispheres was removed by thin slices—till at length a considerable quantity of perfectly limpid and colourless serosity sprang out in a strong jet from the roof of one of the lateral ventricles. Both these cavities, and the third ventricle, were prodigiously distended by the accumulated water. Except that the septum lucidum was remarkably transparent, no other appreciable change existed in the brain or its appendages. A very small quantity of serosity was found in the peritoneum; and but little flowed from incisions made in the limbs. (Andral, *Clin. Méd.*, t. i. p. 134.)

Or the dropsical accumulation may be transferred from its place through a safer channel.

A gouty individual had hydrocele, and his surgeon, for some reason, did not recommend the operation for the radical cure of that complaint. After the hydrocele had lasted for some time, he became one evening intoxicated by drinking an immoderate quantity of rack punch, which greatly disordered his alimentary canal, and brought on a sort of cholera. He had profuse vomiting and purging, which quite exhausted him; and at length he fell asleep. When he awoke in the morning he found that his hydrocele, which had been a large one, was gone: and it never returned. (MS. Notes of *Dr. Farre's Lectures.*)

In a man thirty-six years old, labouring under disease of the heart, and having anasarcous limbs, the right side of the thorax was found to be dull on percussion. One day the patient became suddenly affected with extreme anxiety, and with great though transient distress in breathing; and he began to expectorate an extraordinary quantity of limpid serous liquid, resembling raw white of egg. So profuse was the discharge that he seemed almost to vomit the fluid. It continued for some hours, and then ceased abruptly. The next morning the respiration was easy, the patient felicitated himself on his amendment, and declared that he felt relieved from an enormous weight which had pressed upon his chest. To M. Andral's great surprise, the dulness of the right side had completely disappeared. The case is related by him as an instance of hydrothorax cured by a bronchial flux. Accidental cures of this kind are full of instruction.

If water be injected, in some quantity, into the blood-vessels of a living animal, the animal soon perishes; dying generally by coma, or by suffocation: and when the carcass is examined the lungs are found to be charged with serous liquid, or water is discovered in the cellular tissue of some other part, or in the shut serous membranes. If, however, the animal be first bled, and then a quantity of water be injected equal to the quantity of blood abstracted, the injection is followed by no serious consequences.

It has been ascertained that animals (dogs, cats, and rabbits) survive the extirpation of both kidneys for a space of time varying between ten hours and nine days. Copious and very liquid evacuations from the intestines, vomiting, and fever, precede their death. Clear serum is found in the cavities of the brain, the bronchi are full of mucus, the intestinal canal of liquid fæces, and the blood is more than naturally aqueous. So in the disease called ischuria renalis, the secretion of urine is suppressed, death by coma ensues, and the web of the pia mater, or the cerebral ventricles, are often found full of water. In cholera there is suppression of urine for as long a space, but the brain is unaffected, for the system is drained of its water by the profuse discharges from the stomach and bowels; conversely, in diabetes the skin is permanently dry, the kidneys pour forth their altered secretion with a fatal prodigality.

The several classes of facts which have now been briefly brought into view throw a strong light upon a confessedly obscure part of pathology. It appears that under various circumstances the blood-vessels may receive a considerable and unwonted accession of watery fluid, and that they are very prone to get rid of the redundance. When they empty themselves through some free surface, their preternatural distension is relieved by a flux; if, on the other hand, the surface be that of a shut sac, in discharging their superfluity, they cause a dropsy. Why sometimes this organ and sometimes that is selected as the channel by which the superabundant water shall be thrown out of the vessels is a matter concerning which we can seldom render any satisfactory account. We often find it difficult to determine which of the two facts in question is to be considered the antecedent, and which the consequent. For not only is it true that when the blood-vessels become overloaded with serous fluid, they readily deposit a part of it, but also that when they are in the opposite condition of comparative emptiness, when they contain less blood than is natural, they are equally ready to replenish themselves by absorbing fluids from any source to which they can find access. In the case of the individual who was cured of his hydrocele upon the occurrence of profuse watery discharges from the stomach and bowels, it seems clear that the expenditure of serous liquid from one part led to its absorption into the blood from another. When anasarca suddenly leaves the extremities, or ascites the abdomen, and fatal coma follows, it appears probable that the absorption is the first of the changes, and the effusion the second; and had this effusion been determined to the mucous membrane of the intestines, to the skin, or to the kidneys, it would have brought relief and safety to the patient instead of causing his death.

We have obtained, then, a glimpse of one or two most important principles in respect to the pathology of dropsy. The blood-vessels, when preternaturally full of aqueous fluid, have a strong tendency to empty themselves; when preternaturally empty, they readily drink up watery fluid wherever they come into contact with it. From the discharge of their superfluity of water arises a dropsy or a flux. The cause and the cure of many dropsies lie in these propositions.

The dropsies hitherto considered, resulting from the rapid as well as preternatural pouring out of fluid by the blood-vessels, compose an especial class of dropsies, in which the arterial system is more concerned than the venous, and to which the term *active* has sometimes been applied. For the sake of convenient distinction, and in conformity with established usage, we shall retain that epithet. But the number of these active dropsical effusions, quite independent of inflammation, is small when compared with the whole number of dropsies. The state of the part from which the effusion proceeds borders closely upon inflammation. The condition of its capillary circulation has been regarded as intermediate between that in which the ordinary quantity of secretion is maintained, and that in which inflammatory effusion takes place. The increase of secretion is analogous to what we observe in other parts of the body; to the abundant perspirations, for example, that are occasioned by violent exercise; to the increased flow of tears caused by any irritation of the eye, or by the passion of grief; to the augmented watery discharges from the mucous membrane of the bowels produced by purgative drugs; all of which may be independent of inflammation, but all of which are attended by congestion, that may easily be pushed into inflammation; and it is obvious that if the secretions just referred to were poured forth into closed cavities, instead of proceeding from surfaces that are situated on the exterior of the body, or communicate readily with the exterior, they would constitute dropsies.

A much larger class of dropsies commence in defective absorption. There is no sudden and profuse gush (as in the former class) from the overladen blood-vessels; but the fluid which is healthfully and unceasingly exhaled from the serous surfaces fails to find its way back again into the blood, and gradually accumulates. The mechanism of the morbid process is commonly as follows.

Some cause retards the current of venous blood: hence the veins, and the capillaries by which they are fed, become distended; and this distension constitutes an impediment to the further admission of liquid. Absorption is sluggish, or at a stand. To dropsies thus originating we give the name of *passive.* The venous system is more concerned in them than the arterial.

But we have still to show more clearly that dropsies may and do originate in this manner. The agency of the blood-vessels in the production and removal of dropsy has not been sufficiently recognised till of late; or perhaps it should rather be said, that more importance used to be assigned to the agency of the lymphatic absorbents than they are really entitled to. Pathologists, even of recent date, speak of a want of tone or energy in the absorbing vessels—of the superfluous fluid of the part not being adequately taken up by the enfeebled absorbents, meaning thereby the absorbents properly so called. And this view of the matter, connecting dropsy always with debility as its cause, has infected the whole pathology of the disease, and led to a corresponding mode of treatment, the object aimed at being the stimulation of the absorbents to more vigorous action. This obvious difficulty however presents itself at once to the theory, that dropsy results from deficient activity of the absorbents; viz. that absorption goes on, and to a very great degree, in dropsical patients. Their adipose matter disappears, they get miserably thin. There is no complaint in which emaciation goes to a greater extent than in dropsy. It is found also that persons afflicted with anasarca become readily enough affected by mercury, which of course must be absorbed before it can produce any of its specific effects.

It must be confessed that our knowledge respecting absorption is not complete, nor absolutely certain; but there appears good reason for supposing that the process is shared between the lacteals, the lymphatics, and the veins; and probably somewhat in this manner, that the lacteals absorb the chyle from the surface of the intestines, and convey into the blood the materials for its renovation; that the office of the lymphatics is to take up and carry into the blood that effete portion of the solid constituents of the body which requires to be removed, to make way for a fresh deposit; while the veins imbibe the serous fluid exhaled from the surfaces of serous membranes, and into the meshes of the cellular tissue, as well as poisonous and other substances that are soluble and dissolved in that fluid.

Now, if this be so, one of these last sets of absorbing vessels, the lymphatic apparatus or the venous, may continue to perform its office, while the other fails to do so. This theory is sufficiently consistent with the actual phenomena of dropsical disease; and whether it be altogether true or not, a part of it is certainly true, that, namely, which assigns to the veins a large share in the whole process of absorption. The experiments of Magendie, Fodéré, and others, are quite conclusive upon that point. It has been proved that fluids may pass into and out of the veins through their parietes, independently of any vital process, and by mere physical imbibition and transudation; so that when the veins are distended to a certain point with watery fluid, the introduction of more of the same fluid through their coats is impeded or prevented; and even, when the distension is still greater, the aqueous part of the blood may pass in the other direction out of the vessel. On the other hand, when the veins are comparatively empty, the serous fluid passes readily into them, or, in common language, is absorbed. The venous absorption is explicable, therefore, upon the principles of endosmose and exosmose, as laid down by Dutrochet; or rather, according to Professor Daniell's happy generalisation of Dutrochet's facts, by the theory of heterogeneous attraction.

Imbibition being a form of that attraction, belongs in various degrees to all the tissues of the body. Its rapidity, and even its direction, in respect to the sides of a vessel surrounded by fluid, and also carrying fluid of a certain consistence, must vary with the varying distension of the vessel. When the vessel is moderately full, the exterior fluid passes uninterruptedly inwards,

and is conveyed away by the internal current. When, on the other hand, the vessel is much distended by its contents, the contained fluid, or its thinner part, passes continually outwards. And there is an intermediate degree of distension, at which the pressure is just enough to prevent the transit of fluid in either direction. Magendie found, accordingly, in an ample, well conducted, and conclusive series of experiments, that by regulating the conditions of comparative emptiness or fulness of the circulating system, he could accelerate, retard, or suspend altogether the operation of a poison dissolved in the humours of the body. In other words, he could thus accelerate, retard, or prevent the process of absorption or imbibition through the blood-vessels. If we are once satisfied of the absorbing and transmitting property of the sides of the vessels, we shall have no difficulty in perceiving how any mechanical obstacle occurring in a venous trunk may give rise to dropsy.

Has dropsy ever then, in point of fact, this kind of origin? Let us see, in the first place, as in the preceding branch of our inquiry, what answer experiment affords to this question. So long ago as in the year 1669, our countryman Dr. Richard Lower published (*Tractatus de Corde*) the following facts:— Having applied ligatures upon the jugular veins of a living dog, he observed, after some hours, that all the parts above the ligatures were wonderfully swollen. The animal died in two days; and the cellular tissue about the head and face was found to be distended, not with red blood as Lower had anticipated, but with clear and limpid serum. In another experiment he tied the vena cava just after it emerged through the diaphragm towards the heart. Death ensued a few hours afterwards, and a large quantity of water was discovered in the cavity of the peritoneum, "non aliter quam si ascite diu (canis) laborasset."

These experiments were not instituted with any reference to the pathology of dropsy, yet that Lower perceived their bearing upon that subject is plain from this sentence: "Quantum hæc ad ascitis et anasarcæ causas investigandas conducant, aliis judicandum relinquo." (*Op. cit.* p. 82.) He even explains the extravasation of the thinner or serous part of the blood as taking place by infiltration (*velut in filtro*) through the pores of the vessels. So far back, therefore, at least as the time of Lower's experiments, may be traced the germ of those doctrines respecting the dependence of dropsy upon the mechanical exudation of serum, which have been claimed as original by some recent French pathologists. The more modern experiments and observations have, however, been more carefully made, and are more conclusive. But let us again appeal to the still more satisfactory evidence afforded by the operation of disease in the human body. We find that local dropsy is continually produced in this mechanical way. To take a few very common examples of this, for the sake of illustration. The disorder called phlegmasia dolens, to which lying-in women are very liable, consists in extreme œdema of the foot, leg, and thigh, which œdema results from a blocking up of the femoral vein by coagulated blood and lymph. The essence of the disease is inflammation of that vein, and inflammation of a vein in many cases obliterates its channel. This condition is not peculiar, therefore, to parturient women; it may take place whenever phlebitis occurs in the same situation; it is not uncommon in unmarried females; and it sometimes happens in men. The late Lord Liverpool supplied an instance of it in his own person; and we have known more than one example of the same thing presenting itself in the latter stages of continued fever, in connection with inflammation of the pelvic or abdominal veins. Whenever it is met with, we find the principal vein of the affected limb impervious, or nearly impervious, to the blood. The same change frequently takes place in the principal vein of the arm in women who have cancer of the breast, and then the arm becomes œdematous. In pregnancy, the gravid uterus sometimes comes to press upon the iliac veins and to impede the passage of the blood along them, and anasarca of the lower extremities is the consequence; but the anasarca vanishes so soon as the pressure is taken off by the

delivery of the woman. There is a condition of the liver which the French have termed *cirrhose*, and the true nature of which will be more particularly described hereafter. Where this state of the liver exists, there exists also, in almost all cases, serous accumulation in the peritoneum — ascites. Why is this? It is because the current of the blood through the portal vein is obstructed. A French physician, M. Tonellé, relates several instances in which he noticed obliteration of the venous sinuses of the dura mata, in conjunction with water collected in the cavity of the arachnoid. There is scarcely a large vein in the body that has not been known to have its cavity closed up, or in some way sensibly obstructed, with a corresponding dropsical state of the parts from which it should have conveyed the blood towards the heart. One of the most remarkable cases of dropsy the writer ever saw resulted from the obliteration of the superior vena cava, by the adhesion of its sides which had been pressed together by a large aneurism of the aorta. The man in whose person this occurred was dropsical in his upper half only. His arms were so anasarcous that they projected from his sides; his face was grievously bloated and livid; his eyes were prominent and staring; while his lower limbs were of their natural size, and appeared preposterously small and out of proportion. He looked as if the upper part of his body had been stuffed and exaggerated for acting some character upon the stage; and his whole aspect would have been considered ludicrous had it not been at the same time so pitiable. The writer predicted while this patient was living that the superior cava would be found narrowed by the aneurism. A certain portion of it was fairly sealed up.

All the instances hitherto adduced have been examples of local dropsy, dependent upon the obstruction or closure of the principal vein of the part in which the dropsy existed. And when the impediment, or cause of retardation, is felt at the confluence of all the veins of the body, that is, in the right side of the heart, then we have general dropsy, anasarca of the universal cellular tissue, and an accumulation of water in all or most of the larger serous cavities.

Objections, at first sight plausible, have been made to the accuracy of the conclusions drawn from such cases as have just been mentioned.

Thus it is said that veins have been found obliterated, and yet there was no dropsy.

Now to this objection it may be replied, in the first place, that it is not every vein the obliteration of which would give rise to the collection or effusion of serous fluid. It must be the principal venous trunk of the part affected. When the secondary and smaller veins alone become, some of them, impervious, the blood may reach and return by the primary branches with sufficient readiness to relieve the turgid capillaries, and to preclude any serous accumulation.

But the principal vein itself (it will be said), has been found converted into a solid cord, and still there was no dropsy. True; but it does not follow that there never had been dropsy. It is well known that when a large artery is tied, the circulation is carried on in the corresponding part, or limb, by means of collateral arterial branches; imperfectly, indeed, at first, but at length, as the supplemental channels become gradually more free or more numerous, the supply of blood to the limb is as copious as before. It is just the same, mutatis mutandis, with the veins, only that the anastomosing venous tubes are not so readily developed as the arterial. The writer is not aware of any instance in which it has been shown that the principal vein of a limb was impervious, and yet there neither was nor had been any œdema of the limb. The recorded cases have been met with chiefly in dissecting rooms, and the previous history of the subject has been unknown or unregistered. Mr. Kiernan examined the body of a woman who had excited much curiosity among the medical men by whom she had been seen during life, on account of a remarkable and enormous dilatation of the superficial veins of the abdomen. She was not dropsical, and the cause of the huge varix was sought for with great interest after death. The inferior cava was obliterated. Here the compensating result was obvious to the sight; the new channels had answered their purpose, and performed the func-

tions of the original channel. Whether this woman had always been free from dropsy, Mr. Kiernan does not know.

This objection, therefore, may fairly be considered futile, until some authentic instance shall be brought forward of the obliteration of a large venous trunk, without corresponding effusion or accumulation of serum, either at the time when the observation is made, or at some previous time in the life of that individual. It is, moreover, possible that the obstruction of a large vein may be effected gradually, by the slow encroachment, for instance, of a growing tumour; and the collateral circulation may begin to be enlarged with the first impediment in the vein, and may keep pace with, and countervail that increasing impediment till the closure of the vessel is complete; so that, from first to last, there may be no notable dropsy.

Again, it is truly affirmed, that general anasarca often occurs, without any obliteration of veins, and independent of any discoverable organic disease, either in the heart, or in any other part of the body. We see this every day in weak, chlorotic girls, with bloodless cheeks, and pale lips. The writer had a striking case of this kind not long since under his observation in a hospital patient. It was a good sample of a large class of such cases. The systolic action of this girl's heart was accompanied, as is not uncommon, under similar circumstances, by a loud, distinct bellows-sound. She recovered perfectly, and left the hospital without dropsy, bellows-sound, or any other trace or sign of disease. There could not therefore have been any organic change. There was none; yet there had been, virtually, a retardation of the venous circulation, not by any mechanical obstacle opposed to its course, but in consequence of the debility of that hollow muscle, the office of which is to propel onwards, with a certain degree of force, the blood that reaches it. Girls of this description have weak and flabby voluntary muscles; and it is reasonable to presume that the involuntary muscle, the heart, partakes of the general feebleness of the muscular system, and becomes incapable of sending the blood forwards with the requisite energy. Nay, it is credible and likely, that a feeble heart may in these circumstances yield a little and dilate under the resisting pressure of the blood which enters its chambers; and that, in this way, the occasional but temporary bellows-sound may arise, in consequence of the altered relation between the cavities of the heart and their outlets. And the *juvantia* and *lædentia* confirm this view of the matter. If, tempted by the pain complained of by the patient, or by the violence with which her overtasked heart is throbbing, we take away blood, we find that, whatever present relief she may experience, she is ultimately weakened by the depletion. On the other hand, if we give her steel, feed her well, and administer the cold shower bath, we find that she regains her lost strength, that colour returns to her lips and cheeks, that her palpitations cease, and her dropsy departs. In proportion as the muscular system in general receives fresh tone and vigour, does that particular muscle, the heart, recover the degree of power necessary for the effectual discharge of its proper function, which is very much that of a forcing pump. Such is the way in which we would explain both the dropsy and its cessation. In such cases our patients do not simply recover, they are cured; and we would apply the same explanation to some other forms of dropsy. Andral describes a certain cachectic condition of the body as being a cause of dropsy; persons may be bled into a dropsy, and starved or weakened into a dropsy. These are genuine instances of dropsy from debility, such as the ancients conceived all dropsies to proceed from. It may be that the thin or watery condition of the blood, induced by frequent bleedings, by insufficient nourishment, by poisons, or by other causes, may facilitate its escape through the sides of the vessels; but it seems more probable, that all dropsies arising under the circumstances just referred to, and without any apparent organic disease or change, are mainly, if not entirely, to be ascribed to debility of the heart; and viewed in this way, they are all brought under the same general principle; namely, the retardation of the blood in the veins, and the consequent preternatural

fulness of the blood-vessels. All passive dropsies, at least in our opinion, may ultimately be referred to this principle. This principle being once admitted, several other phenomena, which could scarcely be adduced in proof of its soundness, may find in it their explanation, and thus serve to confirm its truth. Persons of a full habit are observed to perspire readily and profusely; and it is asserted that if such persons are bled, the tendency to perspiration either yields entirely, or is sensibly diminished. (Darwall, *Cyc. Pract. Med.* i. 635.)

Again, it is a common belief that dropsies are more frequent in places where the atmosphere is habitually charged with moisture. Granting this to be a fact, we perceive a reason for it in the discouragement given by such a condition of the air to the cutaneous transpiration. Hence, upon any defect arising in the compensating functions of the kidneys, or other excretories of water, may ensue a dropsy. We must be careful not to fall into the mistake which some have committed in this matter, of supposing that water is absorbed from the humid atmosphere into the body, through the integuments.

By the same principle, dropsies that follow the suppression or cessation of customary discharges are capable of explanation. Palsied limbs are known, in some cases, to become rapidly œdematous. Here the venous current is retarded for want of the usual pressure afforded by the play and stress of the surrounding muscles.

What has hitherto been said, of the dependence of passive dropsy upon some obstruction, virtual or mechanical, to the passage of the blood along the veins, either at the heart, or in venous trunks where no collateral venous channels have been established, has reference to veins of a certain magnitude. The obstruction must necessarily extend to, and be felt in, the capillaries from which those veins are supplied. But it is more than probable that the same things are true also of the capillaries themselves, independently of the larger veins. It has been ascertained by microscopic observations, that in commencing inflammation, the blood soon stagnates in the capillaries, and serous effusion, marked by more or less tumefaction, is one of the earliest results of that impediment to the circulation. So that all preternatural accumulations of serum in the cellular tissue or in the serous membranes, may with great likelihood be included in the same category of unnatural fulness of the vessels — a state which is very commonly the result of retarded circulation. To bring similar morbid phenomena under one general law is at all times convenient and satisfactory; and the general law here indicated is accordant with all the facts embraced in its expression, while it seems open to no serious or insurmountable objection. Until, therefore, a better is proposed, we may place confidence in this, and regard it as a true and sound principle.

There is a very important species of dropsy, with which certain morbid conditions of the kidney are associated, and in the production of which those morbid conditions play sometimes a conspicuous part. In active dropsies, originating in exposure to cold, the kidney frequently sustains serious injury; and thus the foundation is often laid for changes in that gland which are met with in more chronic cases. The same changes occur also where no such violent antecedent disturbance can be traced. The pathology of these slower cases is somewhat obscure; in a large majority of them, however (in all, probably, at the outset of the dropsy), the urine is scanty, and the anasarca increases or decreases as the quantity of urine diminishes or augments. In the few instances in which the urine appears to be sufficient, some other emunctory, and especially the skin, is commonly defaulting. Alterations arise also in the qualities and composition of the urine itself; it is of a remarkably low specific gravity, contains albumen, and is deficient in the amount of its customary salts. This species of dropsy will require a special consideration hereafter; it does not often occur uncomplicated with other organic disease, of which the effect in producing dropsy is more evident; but even in its pure forms it may be shown to come within the operation of the principle already laid down, or at least to offer no objection to it.

In the preceding discussion, extreme cases have been taken to elucidate the two classes of dropsy that have been respectively denominated active and passive. It may help towards a clearer notion of the pathology of which we are in search, if we contemplate the points of resemblance and the points of distinction between the two forms. They resemble each other in the result; namely, in the collection of serous liquid in the circumscribed cavities and vacuities of the body. They differ in the rate at which the collection augments.

In the well-marked acute cases the liquid is rapidly effused, in quantity much exceeding the natural amount of exhalation. In the well-marked chronic cases the exhalation goes on as usual, but the fluid exhaled is not taken back again into the circulating vessels with sufficient facility. In the one case, the circulation is disturbed and tumultuous; in the other, it remains tranquil. It is probable that, in the more acute forms, the serum passes through the coats of the arteries, or of the capillary vessels next adjacent to the arteries. In the completely chronic form, there is a defect of absorption by the veins.

But there are intermediate degrees, in which it appears that the full veins not only are unable to admit a new supply of aqueous liquid, but also to retain that which they already hold, and serosity exudes from them also.

What connects all these forms of dropsy is a preternatural fulness in some part, or the whole, of the hydraulic machine. And this seems to be the great key to the entire pathology, as well as to the remedial treatment of the disease.

The chemical composition of the liquids accumulated in the various forms of dropsy is very similar to that of the serum of the blood. This is what we should expect, supposing our theory of the mode in which these maladies take place to be true. The ingredients are nearly the same in kind, but they co-exist in different proportions. Dropsical fluids contain more water, and less animal matter. The ratio of the saline ingredients is subject to much less variation. The liquid of chronic hydrocephalus is more purely aqueous than any other; it does not coagulate when heated: it holds an extremely small quantity of animal matter; but it is impregnated with nearly the same amount of saline matter as is present in serum. The following tabular result of Dr. Marcet's experimental inquiries on this subject affords a general view, sufficiently accurate, of the relations subsisting between the fluids of dropsy and the serum of the blood*:—

	In 1000 parts of fluid.		
	Water.	Animal matter.	Saline matter.
Fluid of chronic hydrocephalus -	990·80	1·12	8·08
... spina bifida - -	988·60	2·2	9·2
... hydrothorax - -	973·2	19·	7·8
... hydropericardium - -	967·	25·5	7·5
... ascites - - -	966·5	25·	8·5
... hydrocele - -	920	71·5	8·5
Serum - - -	900	90·8	9·2

To this preliminary sketch of the conditions under which dropsy is apt to arise, it may be convenient to add a few remarks upon some of the phenomena belonging to the effusion or collection itself.

It is a familar fact that the water of dropsy frequently changes its place, in obedience to the force of gravity. In general anasarca, when the serous accumulation slowly augments, it first becomes visible about the feet and ankles. There are two causes for this; the one occasional, the other general, in its operation. The veins of the feet and ankles are liable, when the patient is erect, to be more distended than other veins; for, unless the action of their valves be quite perfect, these vessels sustain the weight of the superincumbent column of blood, which concurs with other causes to retard the upward

* Med. and Chirurg. Trans. vol. 2. p. 381.

current, and to gorge the depending capillaries. Under such circumstances the effusion or the arrest of absorption may first take place around the insteps. But in general it is not so. In most cases, the truer and simpler reason of the early manifestation of dropsical swelling about the ankles is merely that the serous liquid which fails to be removed from the cellular tissue in all parts of the body gravitates towards the lowest part; and being thus collected into a comparatively small space, is rendered more perceptible. During the night, when the horizontal posture is maintained for several hours, the œdema of the ankles disappears, but the neck and face, perhaps, become puffy and bloated. And it is obvious why, in these cases, the feet towards evening swell more than the hands: the hands receive the serous fluid from the cellular tissue of the arms alone; the feet that which sinks down, not only from the legs and thighs, but from the head and trunk also. The limbs may be considered as bags, which fill up in proportion to the quantity of liquid detained; and the lungs are similar bags; and in these cases we commonly may hear the crepitation of pulmonary œdema in their lowermost portions.

An instance has been already referred to, where one half only of the body was anasarcous, and that the upper half. The descent of the dropsical fluid was prevented by the dress of the patient; the waistband of his trowsers having compressed the cellular tissue through which alone the gravitating liquid could seek a passage. So, sometimes, it is stopped at a lower point of its descent by tight garters, and the thighs swell earlier than the insteps. It is not at all uncommon to see persons who, in the daytime at least, and in the erect posture, are anasarcous in the lower half only of the body. We do not so often meet with cases of anasarca of one moiety of the body, the division being made by an imaginary plane drawn through its axis. But this does occasionally happen. For the most part this curious phenomenon is merely the result of accident, the patient who labours under anasarca being at the same time unable, from the circumstances of his disease, to leave his bed, or to lie at all except on one side, and then the accumulating liquid gravitates to that side. The writer has, however, seen one case to which this explanation was not applicable. He believes, that some local obstruction to a large vein in the neighbourhood of the shoulder caused œdema there, and the fluid sank down and filled the cellular tissue of that side alone. It was not in his power to verify the truth of this conjecture, for the patient recovered.

Cæteris paribus, those parts of the body become the most loaded with serous fluid, and show the anasarca the plainest, of which the cellular tissue is plentiful and loose, as the eyelids and the scrotum. But in extreme cases the liquid pervades the cellular tissue where it is much more dense and compact; as where, for example, it is subjacent to mucous membranes. In the examination of a dropsical corpse, the mucous coat of the intestines may sometimes be seen to be elevated by the water collected beneath it; it then looks like jelly, and the valvulæ conniventes, which are flat and thin in their ordinary state, become round and convex. Dropsy of the submucous tissue of the air passages is frequently a cause of death.

Many persons seem disposed to ascribe these anasarcous swellings, especially when they make their appearance suddenly, to inflammation; and great stress is laid, and much argument expended, upon the frequency of *inflammatory dropsy*. But the facts that have just been passed in review sufficiently refute this theory. If the serous liquid be the product of inflammation, what is the part inflamed? It cannot be, as some of these writers appear to think, the distended cellular tissue itself; for if so, the inflammation must shift its quarters under the influence of gravity. The term inflammatory dropsy may not, perhaps, be indefensible when applied to that smaller class of dropsical affections which have been spoken of under the head of active dropsy. We are far from denying the frequent agency of inflammation in producing changes which in their turn lead to dropsy: but it will be well not to confound those collections of serum, mixed with blood or coagulable lymph, which are distinctly events

or products of inflammation, with other collections of serum which resemble the former in that respect only, but differ entirely from them in every other particular. To the class denominated active, which occur suddenly, from defect of some one or more of the usual channels of aqueous excretion, and which are attended, usually, with considerable disturbance of the whole system, the epithet *febrile* would not be inappropriate. There may be some few cases in which it is impossible to determine whether the effusion be inflammatory in its origin or not; if the serum be turbid, if we discover in it the smallest admixture of pus, or of flakes of lymph, or if the disease has been marked by the ordinary signs of internal inflammation, we need not hesitate in our opinion. One of the later systematic writers on dropsy in this country holds that all dropsies are more or less inflammatory. We can see one reason for this mistake (for a mistake it surely is) in the relief and amendment which often ensue upon the employment of blood-letting in dropsy.

The general *prognosis* of dropsy will be readily gathered from what has been said of its causes and conditions. That which arises in chlorotic young women is the least perilous and the most curable.

Of the rest, febrile dropsies are more obedient to treatment, and oftener admit of complete recovery, than the passive and chronic.

Local dropsies are to be regarded with hope, in proportion as the obstruction upon which they depend is capable of being removed, or compensated by the development of fresh channels for the delayed blood. As far as the mere water is concerned in the chronic forms of the disease, cardiac dropsies are more readily dispersed for a time, but more likely also to return, than dropsies that are complicated with renal disease. It is obvious also that the immediate danger of dropsical accumulations will depend much upon the place the liquid may occupy. The difference in this respect is immense between the tunica vaginalis and the pericardium, between the cellular tissue of a limb and that which lies beneath the mucous membrane of the glottis.

We are next to consider the principles by which our practice in the *treatment* of dropsies is to be regulated. As, in most cases of dropsy, there are two distinct sets of symptoms observable, those, namely, which result from the presence of the accumulated water, and those which depend on the bodily conditions that have produced the accumulation, so there will arise, in most cases of dropsy, two main indications of treatment—the removal of the dropsy itself, and the suspension of its physical cause. The latter object implies either the complete remedy of the morbid conditions productive of the dropsy, or the establishment of some new condition which shall prevent or countervail their operation.

These two main indications may be fulfilled, in different cases, with very different degrees of facility. If the morbid conditions productive of the dropsy be cured, or their tendencies averted, the accumulated liquid will in most cases soon disappear of itself. But even under these favourable circumstances, its departure may often be accelerated by art. On the other hand, the removal of the accumulated water may often be accomplished, while the more important indication, which strikes at the root of the disorder, and would prevent its return, is capable of being effected slowly only, and with difficulty, imperfectly, or not at all.

The evacuation of the dropsical fluid is first to be attempted through the medium of the blood-vessels. Whatever empties the turgid veins enables and disposes them to refill themselves by drinking up the superfluous liquids of the body, to be afterwards discharged by some of the natural channels of excretion.

The blood-vessels are directly emptied by venesection; and accordingly we find in blood-letting one of our most powerful means of dispersing the water of dropsies. In that class of dropsies which we call active or febrile, the withdrawal of blood by the lancet is beneficial in more ways than one. It helps to relieve that congestion upon which the effusion depends, and which is often

the parent of inflammation: it tends to abate the undue action of the heart; and it facilitates, in the manner already pointed out, the re-absorption of the effused liquid into the veins, and its ultimate elimination from the system.

But although blood-letting is the most direct and certain way of unburdening the loaded veins, and therefore, in many instances, the most effectual remedy for the dropsy, it is by no means adapted to all, nor even to many forms of the malady. It will always, indeed, remove a portion of the aqueous ingredient of the blood, but it expends at the same time its fibrin, and its red particles; it impoverishes the circulating fluid, and so enfeebles the patient more than the indirect measures for evacuating the collected liquid, to be considered presently. Perhaps, by rendering the blood more watery, venesection may indirectly favour the transudation of its serum outwards, whenever the venous current happens to be retarded, but it certainly weakens the central organ of the circulation; and to muscular debility of the heart we have already seen that certain forms of general dropsy may owe their origin—and thus it is that ill-timed or excessive bleeding may be the cause of dropsy. In these forms of anasarca, instead of robbing the veins of their blood, we seek to repair the quality and richness of that fluid, and so to restore the deficient vigour and tone of the whole muscular system, and of the heart in particular.

In many cases, then, it is inexpedient to let blood; and we endeavour to empty the vessels indirectly, and in such a manner as to withdraw from them the more watery parts only of their contents. In other words, it becomes our object to augment the discharge of watery fluid from some one or more of the secreting surfaces of the body; but it must not be the inner surface of a shut sac.

We have already pointed out the close analogy that subsists between dropsies and fluxes. Dropsy is a flux into a closed cavity. Fluxes would be dropsies if the fluid poured forth did not escape; and it is to be remarked that we frequently endeavour to cure a dropsy by establishing a flux.

By what surface or channel this artificial drain shall be attempted is often a matter of the greatest nicety and importance In some cases, we try to promote the discharge of the superabundant water by the way of the kidneys; in others, by the mucous lining of the alimentary canal; in others, by the external skin; scarcely by the pulmonary membranes. The circumstances by which our choice must be determined will come under review hereafter.

In whatever way (not merely mechanical) we propose to evacuate the superfluous moisture, we diminish, directly or indirectly, the quantity of fluid circulating through the blood-vessels. There is no short road between the sac of the peritoneum, or the cellular tissue of the legs and thighs, and the kidneys or the bowels; and the very efficacy of diuretic medicines, and hydragogue purgatives, in unloading the burdened cavities, affords confirmation of the correctness of the views already advanced concerning the dependence of dropsies upon too full a condition of the vessels, sometimes impeding the due absorption, sometimes giving rise to excessive or irregular exhalation; and these views bring us nearer, it is conceived, to the true nature of these disorders, than the exclusive theories either of debility or of inflammation.

By these means, then, specially directed to particular cases, we seek to avoid or to remove the inconveniences and the dangers that result from the imprisonment of the superabundant liquid.

In the febrile form of dropsy we strive to correct whatever functions may be found in error.

In the chronic dropsy, from organic impediment to the venous current, we are desirous of devising measures, 1. for removing the impediment, by unloading, for example, a gorged and tumid liver: 2. for allowing the gradual development of a collateral or supplementary venous circulation; and 3. if we fail of these objects, or find them not obtainable, we then keep the disease at bay, and prevent, if possible, its increase.

Passive, chronic dropsies are much more difficult of cure than the active

and febrile, and will often baffle the best-directed attempts for their relief. We are not to regard those passive dropsies that depend upon the permanent obliteration of a large vein as necessarily incurable, because if a collateral venous circulation be accomplished, the dropsy will cease, to return no more. But we must give nature the credit of the cure in such cases. Time is the best remedy; and all that we can sometimes do is to alleviate in the mean while the most distressing or threatening of the symptoms.

When, in spite of the measures adopted, the dropsical accumulation persists, or increases, and when, as often happens, the imprisoned liquid constitutes, by its pressure, nearly all the suffering of the patient, as well as much of the danger, we may frequently afford much present comfort, and prolong life, by drawing off the fluid, mechanically, through openings made into the part containing it. Paracentesis is the scientific, and tapping the vulgar name for this proceeding. It has been performed, successfully, by means of a small trocar, to evacuate the water from the brain in chronic hydrocephalus; it is often resorted to for the purpose of emptying the peritoneal cavity, and the tunica vaginalis testis; and it is not unfrequently practised to let out the fluid of anasarca; for acupuncture of the legs and thighs and scrotum is only one form of tapping.

Less frequently, paracentesis of the chest is performed in cases of simple hydrothorax. It has been proposed, but never sanctioned in this country, for the removal of the effused fluid in hydropericardium.

In the local variety of dropsy that is called Hydrocele the re-accumulation of the liquid is often prevented by exciting just so much inflammation of the membrane as may cause its opposite surfaces to cohere, whereby the cavity itself being abolished, any return of the disease is rendered impossible.

This is an expedient which we do not dare to employ in other species of dropsy; in ascites, for example: 1. because the inflammation itself would place the patient's existence in imminent peril; and 2. because if it could be safely conducted the adhesion and obliteration would seriously embarrass and impede the functions of other organs.

The circumstances which require and justify this mechanical remedy, and the rules and precautions to be observed in its performance, will be considered when we come to treat of particular forms of dropsy.

Cardiac Dropsy.

The mode in which disease of the heart may occasion general dropsy has already been sufficiently explained. In such cases, indications, more or less distinct and certain, of the cardiac affection, are generally observable. We judge that the dropsy has this origin; 1. by the presence of thoracic symptoms, such as cough and dyspnœa occurring prior to the dropsy: 2. by the direct signs of cardiac disease, such are distended jugular veins, irregular movements of the heart, unnatural impulse, altered sounds: 3. by the history of some previous acute disease, affecting especially the left side of the thorax; or, particularly, by an account of antecedent arthritic rheumatism: 4. by the advanced age of the patient, rendering it probable that some of those organic changes in the heart and large blood-vessels are in progress, which are almost natural in the decline of life: 5. by the absence of all evidence of renal disease. But we see many persons who labour unequivocally under organic disease of the heart, yet who survive even for years without becoming dropsical. The interesting question, therefore, at once arises, of what kind of heart-disease is dropsy a consequence and symptom? The answer is, of such disease of the heart as produces a certain amount of permanent obstruction to the passage of the venous blood. The permanent obstacle must be sufficient in degree to distend the veins beyond their natural capacity. Hence dropsy is especially associated with dilatation of the right chambers of the heart. It would be incorrect to say that the dropsy is dependent on such dilatation, for the dilatation itself is at once an effect and a sign of impeded transmission of

the blood from the right side of the organ. Nor is such dilatation a necessary attendant on the general accumulation of water. The impediment may be sufficient to gorge the right cavities, while it is yet too slight in amount, or too recent in duration, to have dilated them.

What then are the conditions which imply an impediment of the kind we are now considering? The two great vital organs contained within the thorax, the heart, namely, and the lungs, form different parts of one common mechanism, the object of which is to supply every part of the body with blood that has been recently exposed to the air; and these organs, thus closely related in respect to function, are, moreover, so reciprocally dependent, that any structural change occurring in the one tends to produce disease, sooner or later, in the other also.

And it is well worthy of observation, that the order in which the diseases of these organs are connected, as cause and effect, is a definite and constant order; taking place in the direction opposite to that in which the blood circulates. Disease existing in any part of the circuit formed by the right chambers of the heart, the lungs, and the left chambers, becomes a cause of consecutive disease, first in the part immediately behind it. The heart itself, as is well known, is seldom diseased throughout, or diseased in a like manner and degree throughout; and its partial affections, which are exceedingly common, obey the law just announced as being applicable to the whole circuit of the lesser circulation.

Thus organic disease situated at the aortic outlet of the heart, and of such a kind as to hinder the exit of the blood from the left ventricle, gives rise to permanent changes in that ventricle—to hypertrophy, with, or less commonly without, dilatation. The hypertrophy is here a truly compensating and conservative change; and when it is exactly proportioned to, and keeps pace with, the impediment which has given it birth, so as precisely to countervail and balance that impediment, no delay takes place in the stream of arterial blood, and the injury is, as yet, confined to the left ventricle. That chamber is remodelled and adapted to its purpose by the *vis medicatrix naturæ;* and no other evil manifests itself than, perhaps, some slight encroachment and pressure upon the neighbouring parts in consequence of the augmented volume of the heart.

So long as the mitral valve remains healthy and effective, it offers a barrier of protection against the extension of the disease in the direction which is retrograde in relation to the course of the blood. But at length, in most instances, the stress becomes sensible further back. The left auricle and the pulmonary veins become embarrassed, distended, dilated; the blood is detained in the lungs. Then dyspnœa commences. At first it is occasional only, whenever the heart is tasked with the conveyance of a greater quantity of blood in a given time than usual — as in brisk movements of the body, or strong emotions of the mind; or when it is oppressed by circumstances that diminish the capacity of the chest, by a full meal, therefore, by flatulent distension of the stomach and intestines, by the recumbent posture. Afterwards the dyspnœa becomes more or less constant and distressing.

And this gorged and embarrassed condition of the lungs, even when it is permanent, and has reached a considerable degree, may exist without materially interfering with the functions of the right cavities of the heart; for the pulmonary plethora may be relieved by increased secretion from the bronchial mucous membrane. Dyspnœa, even when it has thus become habitual, may precede for some time any appearance of dropsy.

At last, however, the effects of the original evil augmenting and extending, the right ventricle also becomes unable duly to propel its contents into the pulmonary vessels; it continues morbidly full, is first distended occasionally, then permanently, and at length dilated; and with the dilatation we have a turgid venous system, of which we see a part in the prominent veins of the neck.

In this manner, then, may the series of symptoms be explained, so commonly noticed as life advances. We find irregularity of the pulse, preternatural im-

pulse of the heart, occasional dyspnœa, large crepitation, habitually audible in the lower portions of the lungs, more or less expectoration, sometimes tinged, sometimes even loaded with blood; eventually the ankles begin to swell, and the patient becomes by degrees (unless he is cut off earlier in some other way) decidedly and universally dropsical.

Many of the direct signs of diseased heart may exist, therefore, while there is no dropsy: intermissions and irregularity in its movements, palpitation, the impulse proper to hypertrophy. But when dropsy has supervened, we may expect also the signs which denote the dilatation of the right chambers: the heart is heard and felt to beat beyond the præcordial limits, the pulsations become feeble and unequal, if they were not so before; the patient is liable to fluttering palpitations, to extreme and panting dyspnœa on the slightest exertion, even on taking food into the stomach, or adopting the horizontal posture; his skin assumes a dusky hue, and his lips and extremities are apt to be livid.

In these cases the anasarca first becomes manifest about the ankles. During the earlier stages the œdema disappears in the night, and returns towards evening. It is sometimes confined, for a considerable period, to the legs; but by degrees it ascends towards the trunk of the body, the integuments of which become doughy, the scrotum fills, and water collects in the serous bags of the abdomen and thorax. In extreme cases the dropsy is universal, pervading the cellular tissue of the head and face and upper extremities.

As the accumulation of serous fluid is commonly gradual, the reticular tissue, partly perhaps through maceration, but chiefly from continued pressure and stretching, loses its elasticity; and the œdema is soft, and pits readily.

Sometimes, the fluid continuing to increase, the cuticle is separated by it, and large vesications take place on the limbs, or some part of the cellular tissue sloughs, and a breach of surface is made; and the fluid drains off by this vent in great abundance, to the signal relief of the patient. This beneficial accident furnishes a valuable hint to the practical physician.

The ordinary causes of those changes in the heart which lead at length to dropsy have already been casually glanced at.

The most common of them all is advancing life. The morbid change appears to commence in the aorta, and consists in a deposit of cartilaginous or calcareous matter beneath its innermost membrane. By this alteration the elasticity of the artery is impaired; it acquires a facility of dilatation, and the onward passage of the blood, after it issues from the left ventricle, is virtually delayed: hence increased efforts on the part of that hollow muscle to propel its contents, and the gradual backward propagation of organic change.

It would perhaps be more correct to attribute those alterations of structure to that decay, which occurs in virtue of a law that extends to all organised bodies, rather than to disease. Earthy concretions in the coats of the arteries are met with (according to Bichat's experience) in seven persons out of every ten, who die beyond the age of sixty; and Dr. Baillie declares ossification to be much more common in old persons than a healthy state of the arteries.

But the cardiac mischief often originates at an earlier period of life, in acute or chronic inflammation of the membranes that invest and line the heart. Chronic endocarditis, marked at its outset by slight or vague symptoms, appears to be of common occurrence, for its effects are very frequently seen in the dead body. Among the causes of this chronic disease, habitual intemperance especially an excessive or long-continued indulgence in ardent spirits, holds, we believe, the first rank. But acute inflammation of the pericardium, or of the endocardium, or of both simultaneously, is also a frequent source of subsequent changes in the proportions of the several chambers of the heart. Such inflammation may arise from ordinary causes, and exist and run its course independent of any other diseased condition. In by far the majority of instances, however, it takes place in connection with acute articular rheumatism. The frequency of this complication, in those persons at least who suffer rheumatism

in London, is very remarkable. The heart is found to be more or less involved in the disease, in not less than one third of all the patients admitted with acute rheumatism into our hospitals. Of *rheumatic carditis* it has been noticed, 1. That its proper symptoms are often unheeded by the patient amid the severer pains that affect his limbs, and may easily be overlooked by the practitioner who does not vigilantly search for them: 2. That when the cardiac symptoms are well marked, or being but slightly marked have been looked for and detected, they generally cease in a great measure, or entirely, with the cessation of the joint disease they accompany, or that those signs which remain (as unnatural sounds) are not of a kind to induce evident distress, or to claim the attention of the patient: 3. That nevertheless the organ seldom (according to the writer's belief, never) reverts to its former state, or undergoes complete repair; but the structural changes left by the inflammation form the germ of further changes, progressive in their character, and ultimately destructive of life.

Rheumatic endocarditis is more common than rheumatic pericarditis. Each tends gradually to produce such conditions of the heart as occasion dropsy; and it may be worth while, in our endeavour to analyse and trace home these conditions, that we should consider for a moment the manner in which the consecutive changes are brought about.

When, in the course of rheumatic fever, inflammation befalls the lining membrane of the heart, it affects chiefly the valves; and especially (but not exclusively) the valves of the left side of the heart; and most constantly of all the sigmoid valves of the aorta.

It will at once be seen how these valves, by their being thickened, or shrivelled, or puckered, or rendered stiff by their adhesion to neighbouring parts, by their ulceration or perforation, may have their peculiar functions permanently injured; so that they are apt to become, on the one hand, an obstacle to the free passage onwards of the blood, or incapable, on the other, of effectually preventing its backward passage. Hence an imperfect emptying of the chamber that precedes the seat of the special alteration; hence continued striving, and hypertrophy, and ultimately, according to the degree and place of these changes, an extension of disease towards the right side of the heart.

Again, when acute pericarditis is set up, the inflamed membrane either adheres—partially it may be, but more often at all points—to the heart, or it does not adhere. If it does not, the patient dies in the primary attack. If it does, all signs of cardiac disease may disappear. But the seed of future mischief has been sown: *hæret lateri lethalis arundo*; the free movements of the heart are fettered by the adhering bag; the muscle is urged to stronger or more frequent contractions; and this is aided by the effects of the endocarditis, which probably never fails to accompany in some degree the inflammation of the outer membrane. Hence, again, the extension of disease in the direction contrary to that of the blood.

When these facts are taken into account, they will serve to explain how it is, that when we come to examine a patient labouring under manifest disease of the heart, we so very often trace, in his history, one or more attacks of acute rheumatism. They who have not been in the habit of putting the question as to this point, would be surprised at the number of such cases. When the articular rheumatism was present, the heart affection was perhaps unnoticed, or, if noticed, the patient, as he and his medical attendant are apt to think, got quite well; and when, at length, unequivocal symptoms of organic disease of the heart force themselves upon our attention, its rheumatic origin is too often unsuspected or forgotten.

Obstruction to the venous current and dilatation of the right chambers of the heart may be propagated, in the manner now described, from the left side of that organ. But the obstacle may begin at an earlier link of the chain, as in the lungs; and an incidental question of much interest also presents itself, namely, in what kinds of pulmonary disease is cardiac dropsy liable to originate?

Whatever tends to gorge the right cavities of the heart with blood, tends also to the production of general dropsy. On this principle it might be expected that dropsy would form a symptom or direct consequence of some of the acute disorders of the organs of respiration. When, in pneumonia, a large portion of one or of both lungs becomes impervious by air and blood, or when pleurisy fills one side of the thorax with liquid, which shuts out by its pressure air and blood at once from one half the respiratory apparatus, the egress of the blood from the right ventricle, and therefore from the venous system, must be impeded. And, in truth, dropsical effusion is occasionally the result of such disease. That it does not occur more frequently is to be attributed to the free evacuations, and the abstinence, which are early put in force in these complaints, and which relieve the distension before it produces effusion. In one remarkable instance of acute laryngitis which fell under our care, the whole body was anasarcous at the time of the patient's admission into the hospital. His life was saved by tracheotomy, but the dropsical effusion had previously disappeared a few hours after one copious bleeding from the arm. This case illustrates the tendency to dropsy arising under impeded transmission of blood through the lungs; it both exhibits a conformity to the general principle, and affords a probable explanation of its infrequent operation.

Again, lungs that are hollowed out into large cavities, or rendered solid over a wide space by numerous tubercles, are manifestly incapable of admitting into their vessels from the right heart, the ordinary quantity of venous blood. In these cases, however, the whole mass of blood is diminished, and kept within the limit, which does not imply distension of the veins, by the constant agency of various causes; by the imperfect nutrition of such patients in consequence of abdominal disease; by the sometimes copious expectoration; by the wasting diarrhœa; by the profuse perspirations. Accordingly, dropsy is an unusual symptom in pulmonary phthisis, or shows itself in the latter periods only of the disease, in the form of œdema of the legs; and its occurrence then is mainly owing to the debility which affects, in common with the other muscular parts of the body, the moving organ of the blood.

The disease of the lung which most commonly and certainly, though often very slowly, leads to dropsy, is dilatation with or without rupture of its air-cells; in modern nomenclature, *emphysema of the lungs*. In this morbid condition many of the smaller bloodvessels of the organ become gradually obliterated, in consequence of the pressure arising from the stretching of the membranes, upon or between which they ramify. When the dilatation is extensive and advanced, the pulmonary texture is visibly white and bloodless. Meanwhile the nutrition of the body is not impaired; the same quantity of blood continues to be returned towards the heart, but it finds not a ready entrance, when sent from that organ, into the pulmonary bloodvessels; a certain amount of accumulation becomes habitual in the right side of the heart and great veins, and at length the capillary vessels feel the congestion, and more or less anasarca takes place.

It is seldom that secondary disease and disorganisation are produced in the opposite direction; in the lungs, for example, by disease of the right heart, or in the left heart, by disease of the lungs. When progressive disease takes this course, it constitutes an exception to the general rule.

Disease of the bicuspid orifice may lead sometimes to changes in the ventricle beyond it. A scanty supply of blood will cause, we believe, irregular contractions of the left ventricle, and finally hypertrophy of its walls. Usually, when the mitral valve is much diseased, the left ventricle is found to be dilated and thickened; but in the majority of such cases the aortic orifice, or the commencement of the artery, is involved in the disease.

It is laid down indeed by several of the continental writers, and by some of our own, that certain diseased conditions of the pulmonary texture — what is called pulmonary apoplexy, for instance — are consequences of pre-existing

disease of the right ventricle of the heart. It would occupy too much space to specify here the reasons which induce the writer to distrust this doctrine. They are briefly stated in a paper printed in the *Medical Gazette*, vol. xvi.

The same effects upon the venous circulation may arise when there is no primary organic disease of the heart, from mere debility of its muscular tissue; such as occurs in anæmia often; in what is vaguely called cachexia; in exhaustion from habitual loss of blood; in any case, in short, in which the muscular tone is considerably reduced. The muscle is ill-nourished by the thin and watery blood; it cannot tighten upon its contents with sufficient force to drive them effectually forwards; it may even dilate somewhat under the centrifugal pressure of the resisting liquid; the attenuation of the blood concurs to facilitate transudation of its serosity through the coats of the minute vessels, and dropsy ensues.

The anasarca thus arising from debility of the heart and poverty of blood in young, feeble, or delicate women, is so common, as to require a more particular description of its features and circumstances. It seldom goes beyond œdema of the legs, but occasionally the trunk and arms are slightly infiltrated, and the face is puffy and bloated. It is rarely that the large serous cavities are affected.

These patients are pale; their lips, gums, and tongue, are without colour, or but faintly red; their muscles flabby and weak. They are "nervous," easily agitated, of variable spirits, and often hysterical; subject to palpitation of the heart and shortness of breath whenever they ascend a hill, or a flight of stairs, or make any exertion. In very many of them, the systole of the heart is attended with a bellows-sound; and a roaring noise, continuous or intermittent, like the murmur heard in certain shells when applied to the ear, may be heard in the vessels of their neck. Their extremities are readily chilled, their feet are cold at night, and they suffer in the winter from chilblains. They complain of pain in one or the other hypochondrium, most often in the left; and of headach, which occupies now one and now the other temple, or is more generally diffused.

In most instances they are subject to amenorrhœa, or irregular menstruation. Commonly, the discharge is scanty, pale, postponed, and attended with pain, and leucorrhœa is present in the intervals. Sometimes they have tenderness along the course of the veins of the lower extremities, particularly of the saphena and femoral veins. This symptom is frequently observable when the irregularity dates from some sudden check to the actual process of menstruation. Usually the appetite of these patients is slender and fastidious, and they do not like meat.

This form of cardiac dropsy is almost always curable. Most of the symptoms are referable to a deficiency of red blood, and gradually disappear as the improving complexion indicates that the quality of the blood is restored.

It is necessary to remark, that tumours of various kinds (aneurisms of the aorta, cancerous growths, &c.) occupying the thorax, and causing pressure upon the large veins in their neighbourhood, may be the cause of general dropsy. The same is true of certain malformations of the chest, and of certain displacements of the parts within it. In all such cases, the production of the dropsical accumulation may be accounted for upon the same general principles as have been applied to the explanation of cardiac dropsy.

Renal Dropsy.

Renal dropsy is marked by other and peculiar characters. We may be induced to suspect that the dropsy, in a given case, is connected with renal disease,—1. by the absence of any direct symptoms of cardiac disease: 2. by the complexion of the dropsical person: 3. sometimes by certain parts of his previous history: 4. by certain conditions and qualities of his urine.

It is necessary to premise that it is not every disease of the kidney that leads to, or is connected with, the production of general dropsy. Suppuration of the gland may occur; it may contain calculous matter; there may be hypertrophy or atrophy of one or both of the kidneys; and yet from first to last neither dropsy nor any apparent tendency to dropsy. Here again, therefore, as in the former case, the question is suggested, With what kind or kinds of renal disease is dropsy apt to be associated as a consequence?

We shall find, indeed, in the course of our inquiry, that even those special alterations in the texture and appearance of the kidney, of which dropsy may be and often is a symptom, do not always, or necessarily, give rise to that symptom; but may pass through several stages, and prove directly or indirectly fatal, without any appreciable accumulation of water in any part of the body. Yet dropsy is frequently dependent, in part or altogether, upon these special changes in the kidney; and for the present we propose to take into consideration those cases only of dropsy which result entirely from disease of the kidney, and which may accordingly be called cases of pure *renal dropsy*.

The not uncommon occurrence, and the great importance, of this form of disease were first pointed out, about thirteen years ago, by Dr. Richard Bright, to whose sagacity and observation we still owe the greater part of our actual knowledge, both of the connection which so frequently subsists between dropsy and disease of the kidney, and of the peculiar changes which that gland and its proper secretion undergo in such cases.

The morbid appearances presented by the substance of the kidney are such as denote some change in its intimate structure. Its cortical (or secreting) portion is the primary and chief seat of this change; yet what is called its medullary (*i.e.* its excreting) part is also sometimes implicated, but in a less degree.

These morbid appearances relate to the size, figure, and consistence of the organ; to the colour and condition of its surface and of its interior. With respect to some of these appearances, considerable variety occurs in different cases; and this variety is probably connected more or less with different stages of the disorganising process. Thus, with regard to the *size* of the diseased glands, they are sometimes much larger than natural; sometimes of the ordinary magnitude; sometimes considerably smaller. The average weight of the adult human kidney is four ounces. M. Rayer has met with some, in this disease, weighing twelve ounces. The increment and the decrement of the natural bulk belong principally, if not altogether, to the outer secreting portion of the gland. If a longitudinal section of an exaggerated kidney be made, the cortical part is seen to be unduly broad; and the same part is evidently narrow when the whole organ is smaller than common. For this reason, in the latter case, the radiating medullary parts approach nearer to the surface than they are observed to do in a healthy kidney. Furthermore, it would appear that the enlargement is most commonly coincident with the earlier, and the contraction or shrinking with the later, periods of the renal disease.

The *consistence* of the diseased gland is also variable. Sometimes, and for the most part in the earlier periods, it is soft and flabby; sometimes, and especially in the later periods, it is remarkably compact and hard. The size and the consistence of the kidney may be said to be, in most cases, inversely proportional to each other.

Again, the *form* of the kidney, in the disease in question, often undergoes some modification. As the special change proceeds, the exterior of the gland shows a tendency to become indented by linear depressions, and to present a lobular shape. This, however, is by no means a constant phenomenon, even in the most advanced stage of the malady.

When the proper investing tunic is stripped off, and less distinctly through the same tunic before its separation, the surface of the kidney appears mottled, marbled, or stained; of a yellowish grey colour in one place, and of a dark or purple tint in another; occasionally it is pale throughout its whole extent;

more commonly of divers hues, and variegated with little streaks which are portions of veins containing red blood; sometimes the surface is curiously speckled, often uneven, as if strewed with prominent grains, in some instances quite rough and scabrous. These several appearances are usually the more conspicuous, in proportion as the complaint is the more advanced.

The most uniform, however, and characteristic of the morbid appearances are those presented by the cut surface of the kidney when it has been divided into two symmetrical portions by a longitudinal incision. We then perceive that the cortical substance is the main seat of the morbid alteration. It has lost in a greater or less degree, or sometimes almost entirely, its natural red colour and uniform aspect; sometimes it puts on a speckled or granular appearance; but this, in our experience, is less common than a pale homogeneous surface, streaked in general by linear marks, and bearing, when well pronounced, a near resemblance to the section of a parsnip. The view of the incised surface conveys to an observer the notion of some deposit having taking place, whereby the natural texture of the part is obscured, and its bloodvessels are, many or all of them, emptied or obliterated; while the healthier medullary masses are displaced and pushed aside; sometimes compressed and encroached upon; sometimes exhibiting the same yellowish appearance interposed between, and opening out, their radiating striæ. In several instances, along with these changes of appearance and structure, we have found the veins that emerge from the kidney blocked up by firm coagula of blood.

The kidney, in some rare cases, is studded, both on its surface and throughout its interior, with numerous small cysts or cells containing a thin transparent fluid. These cysts have been inaccurately called hydatids. It is not at all uncommon to meet with one or two such cysts in this diseased state of the organ.

It has been made a question whether the various appearances now described, which sensibly differ in degree and combination in different cases, are characteristic of different morbid conditions, or merely of different stages and varieties of the same essential change. Our knowledge of the subject is scarcely sufficient to supply a positive solution of this question. Excepting, perhaps, the cysts, the writer's opinion is in favour of their all being accidental forms and effects of one and the same morbid process. It is proper, at the same time, to state that both Dr. Bright and Dr. Christison appear to incline to the opposite conclusion.

There is still another state of the kidney very different, in its appearance, from any that have yet been mentioned, which is thought however to be in some cases, if not always, the first stage of all in the disorganising process. Without prosecuting for the present the inquiry how far this notion may be founded in truth, we shall describe the state in question. It may be briefly expressed in two words—*sanguine congestion.* The whole organ is gorged with blood, which sometimes drips freely from it when it is cut open. The kidney is in general somewhat flabby, of a deep and dark red, even of a chocolate or purplish colour, nearly uniformly diffused, except that the exposed surface is usually diversified by still darker tuft-like spots, which have been ascertained to be the Malpighian bodies filled with blood.

Of the minute or intimate changes upon which these remarkable morbid appearances depend, we shall be better able to state what is known, and what has been conjectured, when the symptoms and circumstances of the whole disease shall have been more particularly described.

We have already stated that the renal disease of which we are speaking, and about to speak, does not reckon *dropsy* as one of its constant or essential symptoms. We know this, 1. because the dropsy, in many cases, appears to supervene only when the renal disease has reached a certain point in its progress: 2. with more certainty, because the dropsical accumulation is often removed for a time, or even permanently, when we have no other ground for supposing that the physical condition of the kidney has undergone any alter-

ation for the better; nay, when, the dropsy having been cured, we find by examination after death that the renal disease was marked in degree: and 3. and still more surely, because the renal disease is often unequivocally detected as having been present, by inspection of the dead body, or by definite symptoms during life, though there has never been any dropsy at all. Yet the dropsy is a most important incident of the disease, both as frequently constituting most of the distress and much of the danger which attend its progress; and as being the circumstance which in very many, nay, in most cases, first directs our attention to the probable existence of the renal disorder.

The writer's object, it must be remembered, is not to deliver a complete account of this most interesting, formidable, and common disease of the kidney, but to consider it simply in its relations to the subject of *dropsy*.

Let us investigate somewhat more closely those circumstances which, during the lifetime of the patient, conduce to the conclusion that the dropsy under which we see that he labours is renal.

1. There is nothing, that we are aware of, very peculiar or distinctive in the characters of the anasarca itself. When the renal disease sets in suddenly and with acute symptoms, dropsy usually supervenes soon. So also, during its more chronic progress, anasarca is apt to show itself, or to increase, whenever inflammation of any part, or febrile disturbance, happen to ensue. The more rapid and copious the effusion, the less do the dropsical parts pit upon pressure. Of this renal form of the disease it may also be stated, that an accumulation in the larger serous cavities is not, in general, a prominent feature.

2. We naturally look, in a case of general dropsy, for evidence of disease in the thorax, especially of the heart and most particularly of retarded circulation in the veins. If we find no material or adequate embarrassment of the respiratory functions, no deviation from the natural sounds of the heart, no derangement of its regular movements, no alteration in the force of its pulsations, or in the space over which they may be heard and felt, no distension of the large veins of the neck; we then have reason to suspect, at least, that the anasarca is connected with some vice of the kidney.

3. Again, our judgment is guided or assisted, in some degree, by the complexion of the patient. When general dropsy depends upon disease of the heart, the cheeks and lips are occasionally florid, often purplish or livid, frequently dusky and loaded: sometimes (as in chlorotic women, where the heart may be temporarily distended without any strictly organic disease, and the blood is thin and poor) the face and mucous membranes are pale: but in the renal variety of dropsy there is commonly a strikingly characteristic hue; an evident want of red blood, indeed, in the capillaries, but an unhealthy, dingy sallowness withal, an aspect such as reveals to an experienced eye the existence of some visceral disease in the abdomen.

4. Our suspicion that the kidney is the organ in fault is strengthened, if we trace certain accidents in the history of our patient. An attack, for example, of illness, attended perhaps with temporary swelling of the body and disturbance of the urinary functions (acute dropsy, in short) soon after some exposure, under unfavourable circumstances, to the influence of cold, either applied to the external surface or to the stomach by a draught of cold drink. For there is reason to believe, that in acute dropsy is often laid the foundation of those peculiar changes in the kidney, which, since they were first pointed out by Dr. Bright, have been chiefly studied in their connection with chronic dropsy: that as rheumatic carditis may occur, and become latent as to its effects for some time, and yet implant the germs of future cardiac dropsy, so the stress or strain (of whatever nature it be) that befalls the kidney in cases of febrile dropsy, may set on foot a morbid process which long works silently and unobserved, but which, at last, gives notice of its operation by symptoms, the reproduction of dropsy in a more chronic form being the most significant symptom of all. The acute attack may have been forgotten; there have been no obvious (though there may have been ill understood) indications of the

renal affection; and its existence has been unsuspected. On this account we have thought it best to postpone the consideration of acute or febrile dropsy; and these are points to be more closely examined hereafter.

The previous history of intemperate habits would be of importance also in aid of our diagnosis, if these same habits had not a like influence in causing disease of other organs as well as the kidneys, and especially of the heart. There may, however, be no such episodes as these in the history of the patient: the dropsy may have come on immediately after some exposure or obviously injurious influence, yet not with acute symptoms, and in a temperate subject: in which case it is probable that the renal disease had pre-existed in a latent state; or the anasarca may have arisen by degrees, and without any apparent exciting cause. Suppression of the catamenia, and blows on the loins, have each been precursory of this form of dropsy, sufficiently often to raise a suspicion that the change in the kidney has been somehow a consequence of these accidents.

5. The most remarkable and sure evidence of the existence of the renal disease is to be found in the state of the urinary secretion. Some of the characteristic qualities of the urine are very obvious, or easy of detection when sought for; others require for their discovery some little chemical knowledge and skill.

The more obvious characters of the unhealthy urine relate to its quantity, its sensible qualities, the presence of albumen in it, and its specific gravity. And because they are obvious, these are the circumstances which, for the generality of practitioners, are of chief importance, and most require to be attended to and understood.

The quantity of urine secreted in this disease of the kidney is inconstant. It always falls short of the ordinary standard, in the outset of the dropsy. In the acute cases, also, and whenever febrile symptoms supervene in the chronic, it is invariably diminished. And by this deficient expenditure of aqueous fluid through the kidneys, while the exhalation from the surface is also scanty or annulled (as in most instances it is found to be), may be explained, in great part, the occurrence of the dropsical accumulation. As the disease advances, the urine often returns to its natural amount; and not unfrequently is secreted in excess.

The average quantity of urine voided in the twenty-four hours by a healthy adult, has been variously estimated. It may safely be put at about two or two and a half imperial pints; that is, from forty to fifty fluid ounces. Sometimes in the disease in question it does not exceed one or two ounces, or is even suppressed altogether; and when this is so, the patient must be considered in imminent danger of some fatal affection of the brain. More generally, the patient voids from half a pint to a pint and a half of urine daily. In certain cases, or in certain stages of the disease, and chiefly in the advanced stages, the quantity may reach four or five, or even six, pints daily. These observations are to be understood as having no reference to the effects of diuretic medicines.

It may be stated as the rule, that the dropsy lessens as the urine becomes more copious, and contrariwise. But to this rule there are numerous exceptions. The dropsy may even augment while the quantity of urine is increasing. In such cases other agencies are probably in operation besides the mere kidney disease, such as debility of the muscular parietes of the heart engendered by the disease, or an altered and more aqueous condition of the blood, to be more particularly described hereafter.

Whenever we find anasarca steadily persisting, or perhaps extending, while the quantity of urine, uninfluenced by diuretics, exceeds the average proper to the patient, we have reason to suspect the dropsy to be renal. The same phenomenon is, however, sometimes to be observed in the cardiac form of the complaint, as well as in the anasarca that occasionally supervenes in the latter stages of diabetes.

The sensible qualities of the urine are variable also, and differ at different

periods of the disorder. Often it is dingy and dark-coloured, brown, like slightly turbid beer; sometimes it is distinctly, sometimes obscurely, tinged by the colouring matter of the blood; frequently it deposits a dark-brown or soot-like powder, which is evidently composed of the coloured particles of the blood, changed in appearance, and probably blackened by the acid in the urine. Often, also, the urine is of a pale hue, not quite transparent, hazy, exhaling but little of the characteristic smell of healthy urine, frothing readily, and long retaining its head of froth. This depends on the copious presence of an unusual ingredient, to be presently mentioned. Sometimes, but not very frequently, the urine throws down more or less of the common lateritious sediment, and paints the bottom of the vessel pink. Sometimes, again, the secretion does not deviate materially, or appreciably in its appearance from that which belongs to health. Of these several appearances, that which manifestly arises from the admixture of a greater or less quantity of blood, is the most to be relied on as indicative of the renal disease. It is most common in the early stages of the dropsy; and in the acute variety these sanguineous impregnations are rarely, if ever, absent.

A still more remarkable and important quality of the urine in these cases is that it contains albumen. This substance is not to be found, at least in appreciable quantity, in the urine of health. It was noticed long ago by Dr. Wells, and by Dr. Blackall, that in certain forms of dropsy the urine was albuminous. It was this same quality that most arrested Dr. Bright's attention also in the outset of his valuable researches into this subject. More particulars respecting the albuminous impregnation have been since determined by himself and by others, and especially by Dr. Christison.

This is a circumstance easily recognised, although it does not constitute one of the sensible qualities of the urine. In a work of this kind it is necessary to specify the means of detecting the albumen, and to point out the limitations within which only it is to be considered a sign of disease in the kidney.

Albumen begins to solidify at the temperature of 160° Fah.; but when diluted it may require for its complete coagulation, the heat of 212°. Hence one simple test of its presence: we discover the admixture of albumen with the urine, by heating that fluid to the boiling point. This may be most conveniently done in a small glass tube, by the flame of a spirit lamp. The use of such a tube is preferable (as Dr. Christison has shown) to the common expedient of a spoon, for it enables us to measure with greater exactness the quantity of albumen deposited. When, as is sometimes the case, albuminous urine is already turbid from the admixture of the lithates, these dissolve as the heat is applied, and the urine first becomes clear; then, as the heat is increased, the albuminous cloud begins to be visible. Suspected urine may be hazy also in consequence of its containing mucus: when its transparency is much troubled, it is well to filter the fluid before testing it.

The phenomena observable in the heated urine vary in different cases, chiefly by reason of the variable quantity of albumen which it previously held in solution. The whole is sometimes converted into one gelatinous mass: but this is uncommon. Usually the albumen first appears in the form of a whitish cloud, of which the constituent particles multiply, and collect, in proportion as the quantity is considerable, in small curdy fragments or flakes. These soon subside to the lower part of the tube, leaving the supernatant liquid clear. The amount of albumen is of course to be estimated by the portion of the tube that it occupies.

Dr. Christison has proposed certain terms, indicative of the degrees in which the urine is found to coagulate in different cases; which terms, or some others of equivalent import, it is extremely desirable that physicians should generally adopt, in order to reduce the results of their diversified experience to the same scale. His nomenclature comprises seven degrees of coagulability.

1. *Gelatinous by heat.* 2. *Very strongly coagulable*, where a precipitate distinctly separates by heat, and yet occupies, in twenty-four hours, the whole

or nearly the whole fluid. 3. *Strongly coagulable*, where the precipitate in twenty-four hours occupies half the volume of the fluid. 4. *Moderately coagulable*, where it occupies a fourth of the fluid. 5. *Slightly coagulable*, where it occupies an eighth of the fluid. 6. *Feebly coagulable*, where it occupies less than an eighth of the fluid. 7. *Hazy by heat*, where the urine becomes cloudy, but does not form visible flakes a few seconds after being boiled. In appreciating the last degree of impregnation, it is convenient to heat only the upper half of the fluid in the tube.

But this test of heat is not conclusive nor sufficient. There are circumstances that may impede or prevent its effect in coagulating albumen, which is nevertheless present. On the other hand, it may under other circumstances produce a fallacious appearance of albumen where none exists.

Albuminous urine has, ordinarily, a less acid reaction with litmus paper, than healthy urine. This fact is explained by the theory which accounts for the presence of the albumen; namely, that a portion of the serum of the blood, containing salts of soda, is mingled with the altered secretion. In consequence of the abundance of the serum, or of the previous administration of certain drugs, or from other causes, the urine, when recently discharged from the body, may be neutral or alkaline; or it may become neutral, or alkaline, by spontaneous decomposition after its removal from the bladder: in any case the urine thus alkaline or neutral will not coagulate when heated, even though it may be full of albumen. Again, though there be no albumen, heat may cause a flaky precipitate, consisting of the earthy phosphates.

We avoid, or remedy, these sources of fallacy, by testing the suspected urine with nitric acid, which has the property of precipitating the albumen in a flaky or pulpy form. It will thus detect albumen when the tested urine is alkaline; and by restoring its acidity it will make the albumen discoverable by the test of heat. It has likewisethe effect of re-dissolving the spurious precipitates which may be thrown down by the application of heat, and consequently of showing that they are spurious.

Nitric acid alone however is not, any more than heat alone, an unequivocal criterion, in its effects, of the presence or absence of albumen. For it may occasion a flaky precipitate of lithic acid, when there is no albumen. But this defect is compensated by the complementary test of heat, for the precipitate is re-dissolved by raising the temperature of the urine, while any coagulated albumen remains insoluble.

Moreover we are informed by Dr. Christison that in his experience "sometimes nitric acid added in excess did not separate albumen which had been present in large quantity — a fact which is probably to be ascribed to the albumen itself having undergone more or less decay along with the other principles of the urine." (On *Gran. Degen. of the Kidney*, p. 45.) Hence the urine should, if possible, be examined before it has become decomposed by lapse of time. By the employment, however, of both these tests, with different portions of the same urine at the same time, and with the same portion in succession, we avoid all risk of mistake.

Although the volume of the coagulated albumen may be considerable, its weight is insignificant. According to Dr. Bostock, water which contains only $\frac{1}{1000}$th of its weight of albumen is rendered opaque by boiling. And Dr. Christison tells us that one part of albumen by weight, in 100 parts of urine "will render it almost a thin uniform pulp when heated." The largest quantity he had met with was 27 parts in 1000.

There are other tests frequently spoken of, and sometimes recommended: particularly the ferrocyanate of potass, corrosive sublimate, creasote, and oxalic acid. They are unnecessary in addition to heat and nitric acid, and they are liable to fallacies, from which these last, when combined, are free. They are mentioned here, therefore, with a caution to the merely practical physician to avoid them. To an expert chemist such a caution is, of course, superfluous.

But the urine may contain albumen, when there is no disease of the kidney. This circumstance has given occasion to much controversy, and has thrown a needless shadow of doubt over the true relations that obtain, in the disease we are considering, between the gland and the quality of its secretion.

The recorded evidence of numerous observers concurs in establishing the facts,—1. That urine which is albuminous may, or may not, be connected with renal disease; and 2. That the cases in which it is so connected are, in general, easily distinguishable from the cases in which it is not.

It is certain that some articles of food have the effect, in some persons, of rendering the urine for a time albuminous; perhaps it would be more correct to say that certain forms of indigestion cause this change. Albumen has been detected in the urine in that general state of irritation produced occasionally by mercury, or by a blister to the skin. In the crisis of some febrile disorders, and in some cases of pregnancy, the same phenomenon has been observed. Whenever blood, proceeding from any part of the long tract of mucous membrane which lines the urinary organs, mingles with the urine, that fluid of necessity contains albumen, and coagulates when tested by heat or nitric acid.

On the other hand, when the kidney is really affected in the way already described, the admixture of albumen with the urine is apt to disappear, for a while, even suddenly. We have known it disappear for several hours immediately after the effectual application of a hot air bath, and after profuse purging by a full dose of elaterium. Sometimes it is absent for a longer period.

Nevertheless, if the urine, for a considerable space of time, be pretty constantly impregnated more or less distinctly with albumen, if the albuminous condition of the urine be concomitant with anasarca, particularly if the urine be deeply charged with albumen, and more especially if another remarkable alteration be observed, namely, a sensible diminution of the specific gravity, no reasonable doubt can remain that the kidney disease is in progress.

3. We ascertain, therefore, the density of the suspected urine.

More exact observations in regard to this point, also, have been made and published of late years, especially by the late Dr. James Gregory, junior, of Edinburgh, and by Dr. Christison. The same discrepancy is to be regretted in the statements of different authors respecting the average specific gravity, as respecting the average quantity, of healthy urine. While Dr. Prout places it any where between 1010 and 1015 (that of distilled water being 1000), M. Solon describes it as ranging from 1020 to 1024, and Dr. Christison estimates it at 1024 or 1025. We shall assume the latter to be the nearest to the truth, both because it is avowedly founded upon the result of numerous trials, and because, if it be not exact, it is less likely than the number given by Dr. Prout, to lead us into erroneous conclusions in reference to the disease in question.

Perhaps it is scarcely requisite to admonish the reader that the question of specific gravity must always be contemplated in relation to the absolute quantity of urine secreted. The specific gravity depends upon the proportion of the solid constituents of the urine contained in a given quantity; if the aqueous portion be augmented, the effect upon the absolute density will be the same as if the solid contents were proportionally diminished. But when, as frequently happens in this renal disease, the specific gravity decreases while the quantity of the urine decreases also, that conjunction of phenomena becomes especially significant.

The three circumstances that have now been mentioned,—all of which it is easy to determine, namely, the quantity of urine secreted in a given time, its impregnation with albumen, and its specific gravity,—constitute, together and by comparison with each other, a very accurate and trustworthy test of the presence or absence of the renal disease.

It has just been stated that the albumen not unfrequently disappears, capriciously as it were, even early in the disease, for a time. But it is no less true that it sometimes ceases altogether, although the renal disease may be fixed.

This is most often the case in the advanced stages of the disease. The general rule is that the albumen is plentiful and almost constant in the outset of the malady, less certainly present as it proceeds; and sometimes entirely absent in its latter periods. Now it is of importance to remark that the alteration in the specific gravity of the urine follows a contrary law. The declension of density, so far from being corrected, augments with the progress of the disorder. Hence the one of these morbid phenomena is a valuable check upon the other, considered as an index of what is going on in the kidney.

At first the specific gravity is not much below the natural standard; but it sinks from 1020 perhaps to 1016, and at length, as the renal malady increases, to 1010, 1008, and even lower. Solon once noticed it as low as 1003, when the diurnal quantity was 44 ounces. The lowest density ever noted by Dr. Christison, the quantity not being in excess, was 1004. We may, with Solon, place the average specific gravity of the urine in this complaint at 1013.

Allowing always for the quantity of the secretion, if we find that albumen ceases to manifest itself on the application of the proper tests, and the density be decidedly low, we must not be led to infer or hope, merely from the absence of albumen, that the kidneys are sound.

These characters of the urine, rightly weighed and interpreted, reveal therefore not only the existence of the renal disease, but also, with great probability, the stage or degree it has reached.

There are yet, as has already been intimated, other altered qualities of the urine in this disease, very curious in themselves, but requiring for their detection a greater expenditure of time, and more chemical knowledge and dexterity than the qualities already passed in review. They are, on that account, of less practical value to most practitioners; yet they deserve to be known, both as forming an important portion of our science on the subject, and also as furnishing data for speculation in respect to the nature and cause and mutual relation of some of the more obvious symptoms.

The specific gravity in this malady of the kidney being unnaturally low, notwithstanding the presence of the new substance, albumen, it follows as a matter of inference, and it is found as a matter of experience, that the solid constituents proper to the urine when healthy are sensibly diminished. These solid ingredients consist mainly of urea, and of certain saline matters. In a secretion so variable in its quantity, density, and composition, no fixed or absolute ratio of these ingredients can be assigned, either between themselves or to the liquid in which they are contained. But, in renal dropsy, the average ratio of the solids to the aqueous portion of the urine is plainly lessened. The average quantity of urea has been found to lie between three and four per cent. of the weight of the urine, and the average quantity of the salts between two and three per cent. Dr. Christison ascertained that in a state of health, the specific gravity of the urine being 1029, and the quantity voided in twenty-four hours being 34 ounces avoirdupois, the aggregate of its solid contents amounted to 67·7 parts in 1000. This result coincides almost exactly with that of the analysis published by Berzelius, according to which, 1000 parts of urine contain 933 parts of water.

In trials made by Dr. Christison, the quantity of solid ingredients in the urine of patients labouring under renal dropsy has been found diminished to one fifth, and in an extreme case to nearly one twelfth, of the average proportion; and he estimates the decrease of the urea as being fully answerable to the diminution of the other solid constituents. Now it has been conjectured by Solon and others (and the conjecture was a natural one), that the albumen might be formed by a sort of conversion at the expense of the urea; since these two substances, by slight alteration in the ratio of their elements, pass respectively each into the other. But this conjecture has been shown to be unfounded. Ten years ago Dr. Christison had observed, that when the urine was deprived of the greater part of its urea, the quantity of albumen contained in it was small; and, on the other hand, in cases where the urea was consider-

able in quantity, the albumen also was plentiful. In his recent work on this subject Dr. Christison states that the whole of his subsequent experience has been in conformity with this observation.

The same conclusion, namely, that the albumen is not vicarious of the urea, is supported by the remarkable fact that coincident with albumen in the urine, urea has been found to exist, in considerable quantity, in the blood, where, during health, no trace of it can be detected. And this leads us at once to consider the principal alterations which the blood undergoes in this disease. Upon this subject we are greatly indebted to the researches of Doctors Bostock, Christison, Babington, and G. H. Barlow. We have indeed much less frequent opportunities of examining the blood than the urine; and the inquiry has hitherto been less fertile of practical indications; yet it is full of interest, and deserves to be carefully followed out.

It has been ascertained, then, 1. That in the disease we are considering, the blood often contains urea. 2. That the serum of the blood is apt to be of a lower specific gravity, and to be less albuminous, than in the healthy state. 3. That the proportion of its fibrin varies. And, 4. That the colouring matter of the blood gradually decreases in quantity during the progress of the disease.

Modern physiologists are agreed that urea is not formed by the kidneys, but merely abstracted by those organs from the blood as fast as it is received or generated there. Whenever this process of separation is suspended or defective, a portion of urea remains in the circulating blood, and may be detected by its proper tests. Urea has been thus discovered in the blood of animals after the extirpation of their kidneys. In the blood of patients afflicted with renal dropsy it has been found as plentiful even as in their urine. And not in the blood only, but in the various fluids derived from the blood; and particularly in the liquids effused into the ventricles of the brain, into the pericardium, pleuræ, and peritoneum.

According to Dr. Christison, whenever there is a material reduction of the daily discharge of urea by the urine, it may be distinctly found in the blood; but not otherwise. And he considers the reduction to be material if the quantity excreted be diminished to about one third of the natural amount.

Again, the serum of the blood has been ascertained to contain in this disorder a less than common share of albumen, and to be of an unnaturally low density. The average specific gravity of healthy serum is 1030. It is apt to be reduced to 1024, 1020, and even to 1013. Dr. Babington declares that in cases of coagulable urine, he has always found the specific gravity of the serum much below the healthy standard. The quantity of albumen in healthy blood averages from 65 to 69 parts in 1000. In this disease, Dr. Babington has met with as little as 16·10 parts.

The general truth of these statements is corroborated by the results of Dr. Christison's experience; but the information which he renders is more precise. He has noticed that a definite but inverse relation subsists between the coagulability of the urine and the density of the serum; that the more albumen there is in the former, the lower is the specific gravity of the latter fluid. Hence it is, in the earlier periods of renal dropsy, that the density of the serum is the most diminished, inasmuch as the urine is then most highly charged with albumen. In proportion as albumen, with the progress of the malady, becomes less perceptible in the urine, it becomes more abundant in the serum; the specific gravity of which returns towards, and may reach, the degree that belongs to health. But in all stages of the disease, whenever albumen appears plentifully in the urine, as during febrile reaction, the density of the serum sinks.

It would appear, therefore, that the presence and proportions of albumen and urea in the urine do not depend upon any vicarious conversion of one of those substances into the other, but upon reciprocal alterations in the normal components of the blood and the urine; the deficiencies of the one fluid balancing the superfluities of the other.

Again, it results from the concurring experience of Dr. Christison and Dr. Babington, that the ratio of the fibrin in the blood is usually increased in the early stage, and during the existence of febrile disturbance in any stage of the disease. At the same periods, the blood presents the buffy coat. Under ordinary circumstances, after the early stage has gone by, the quantity of fibrin most commonly reverts to the natural proportion.

In healthy human blood, Dr. Christison has found the quantity of dry fibrin to vary from 25 to 52 parts in 10,000. During the early stage of the renal malady, he has known it as high as 82, and as low as 30 parts.

Reaction being present, he has met with as much as 85 parts in the middle stage, and 56 parts in the advanced stage. Under other circumstances, it commonly ranges between 27 and 43 parts.

Lastly, the colouring matter of the blood, which is but little if at all affected in the outset, diminishes gradually where the disease continues, and at length is so much reduced as to form less than a third of the healthy average. If venesection be occasionally employed, this process of depravation is accelerated; but it takes place, whether blood be artificially withdrawn from the system or not. "I am acquainted," says Dr. Christison, "with no natural disease, at least of a chronic nature, which so closely approaches hæmorrhage in its power of impoverishing the red particles of the blood."

In the male sex, the healthy proportion of the hematosine is 1335 parts in 10,000. Dr. Christison has seen this reduced, in a young man ill three months and a half, subsequent to scarlatina, who had never been bled before, to 427. This change in the blood is invariable.

It has been already stated, that dropsy, however frequent, is not a constant or necessary consequence of that renal disease, for which, since it was made known to us by Dr. Bright, no unexceptionable name has hitherto been devised. There are other symptoms, which also very commonly present themselves in the course of the same disease, but are not essential to it. They often accompany and complicate the dropsy, and therefore claim our notice in this place.

One of the most common and most important of these complications, is the occurrence of what are compendiously called head symptoms; various manifestations of derangement in the cerebral functions; headach, drowsiness, delirium, epileptic seizures, apoplexy. So frequently, indeed, is the death of the patient preceded by convulsions or coma, that Dr. Christison has rightly considered this to be the "natural termination" of the disease, or "the mode in which it proves fatal, when life is not cut short by some other incidental or secondary affection." Of seventy fatal cases observed by Dr. Bright, death was ushered in by well-marked cerebral symptoms in thirty.

The circumstances under which these affections of the brain take place, have been ascertained with tolerable accuracy. They are almost always preceded by a great diminution, or an entire suspension, of the secretion of urine. This connexion of coma with suppression of urine has long been recognised, and it is well exemplified in the disease under consideration. If the quantity of urine becomes very scanty, so as to amount to no more than two or three ounces in the twenty-four hours; and especially if the deficiency occurs suddenly; and more particularly if there be a total cessation of the secreting function, we may reckon upon the speedy dissolution of our patient, and that he will die comatose, and perhaps after convulsions. But this rule is not so strict as to offer no exceptions. Occasionally, though seldom, it happens, that the urine is reduced to a very small amount, while the head remains unaffected. Of this Dr. Christison records a remarkable instance. One of his patients passed no more than two ounces of light urine daily for nine days before his death, yet he remained sensible to the very last minnte of his existence, and died simply of inanition. Somewhat less unfrequently apoplectic symptoms arise and carry off the patient, although there has been no extreme or material reduction in the quantity of urine.

When a case has terminated in this manner, serum is sometimes found accumulated in unnatural measure in the cerebral ventricles, and in the tissue of the pia mater. The dropsy has extended to the brain. And under these circumstances, although it may be difficult or impossible to determine when and with what rapidity the serum has been effused, its presence and its pressure may fairly be assumed to have produced the fatal symptoms. That this is one, at least, among the causes of the coma, is rendered the more probable by the connexion that may sometimes be noticed between the coming on of that state, and the visible increase of the dropsy in other parts of the body. The experience of the writer accords fully with the following remark of Dr. Christison, "If the dropsical fluid be allowed greatly to accumulate, drowsiness, the first symptom of the affection of the head, very soon makes its appearance in the generality of cases, and it will speedily pass to fatal coma, if not controlled; but the removal of the dropsy will usually remove the drowsiness."

In many instances, however, there is found no morbid collection of water within the skull, nor any appreciable change; and in some instances there is no dropsy of any part: and this fact, taken together with the usual failure in the quantity of urine, and the ascertained presence, sometimes, of urea in the blood, and even in the natural serosity of the encephalon, has led to the construction of a theory, which refers the ultimate symptoms, the stupor, and the death, to the poisonous influence of the urea of the unpurified blood upon the brain and nervous system. The theory is ingenious and plausible, and, to a certain extent, it is probably true; but it cannot yet be regarded as being fully proved, and some of Dr. Christison's observations are even calculated to raise a strong doubt of its soundness. He states that he has repeatedly known the daily discharge of the solids of the urine to be reduced, for weeks together, to one fourth of the natural amount; while, moreover. the analysis of the blood showed that it was loaded with urea, without the appearance of any symptom of an affection of the head. Dr. Bright also records a case to the same purpose. A person labouring under this disease of the kidney lived for four or five years under his occasional observation. The blood was analysed in the earlier stage, and found to contain a large quantity of urea, as much as the urine itself contained. Yet this patient had no fits till towards the close of his life. (*Guy's Hosp. Rep.* p. 360. Case vi.)

Another not improbable hypothesis connects the supervention of stupor and coma with the pale and watery condition of the blood. That similar symptoms are apt to arise in conjunction with a similar defect of hæmatosine, has been well known since the publication of the remarks of the late Dr. Gooch, and of Dr. Marshall Hall, on that peculiar form of cerebral affection. It would seem that, in such cases, the functions of the brain are exercised irregularly, languidly, and at length not at all, in consequence of the failing supply of its appropriate stimulus through the arteries.

Another striking circumstance observable in this disease, is a readiness of various organs of the body to inflame, and particularly of the serous membranes. According to M. Solon, this disposition has not been so manifest in France; but of its frequent appearance in this country, the writer can add his own testimony to that of Drs. Bright, Christison, and Gregory. Such intercurrent acute inflammation is a not uncommon cause of death. The pleura is much more often affected in this manner than the peritoneum or the pericardium. Among 100 cases, recorded in a tabular form by Dr. Bright, the pleuræ were ascertained to be healthy in 26 instances; in 40 cases, old adhesions were discovered; and in 16, the ordinary evidence of recent inflammation.

It follows from this tendency that, when we come to inspect the dead body, we seldom find the kidney to be the only part in which structural change is manifest. Most commonly evident traces of disease are met with in various organs.

Disorder of the stomach and bowels is, certainly, a frequent companion of the malady. Nausea; vomiting; flatulent distension; diarrhœa.

It would appear, however, that these incidental complications prevail with irregular frequency in different places. They are probably owing, in some measure, to local and peculiar agencies. Thus, vomiting and diarrhœa have been more familiar to the Edinburgh observers than, in London, to Dr. Bright, or, in Paris, to M. Solon: while the headachs and coma so often witnessed by the British physicians have been comparatively uncommon in France.

All the writers on this subject acknowledge the frequent association of cardiac disease with the renal. And in respect to this concurrence of structural alteration in the heart and in the kidney, several obvious and interesting, but hitherto unsettled, points of inquiry present themselves. Some of these we may mention, as being fit subjects for future investigation.

Where both the organs are diseased, which of them suffers the earliest change? Can the disease in the one be considered as being a cause of the disease in the other? What respective relation have these diseased conditions to the dropsy?

It is generally difficult, when we find both organs altered in structure, to trace the course of the patient's maladies so accurately as to determine which change has been primary, which consecutive. It is highly probable, indeed, that, in certain cases, the cardiac disease and the renal disease have no relation to each other as cause and effect, but are both consequences of some general cause; of habitual intemperance, for example.

Is the renal disease ever produced by the cardiac? We might more easily arrive at an answer to this question, if the real nature of the change which the kidney undergoes were better understood. In the acute renal cases, when they prove early fatal, the kidney is always found to be gorged with blood. And the accustomed admixture of blood with the urine warrants the belief that the same condition was present in patients who have recovered. From this state of engorgement (which is not acute inflammation, since the ordinary events of acute inflammation in that organ do not follow) springs, apparently, the subsequent series of changes. It is therefore a plausible conjecture, that whatever tends to cause congestion of the kidney, tends also to aggravate, and may even produce, the peculiar changes in question. Now that disease of the heart, and especially such disease of the heart as leads to dropsy, occasions congestion of the venous system, and in this way gorges the viscera with blood, is well known. Under this influence the liver often enlarges. So that in cardiac disease connected with dropsical accumulation we might *à priori* expect congestion of the kidney, and structural alteration in consequence of such congestion.

A serious objection to this view of the matter is presented by the fact, that dropsy often arises from disease of the heart, lasts long, and proves ultimately fatal, without the occurrence of albuminous urine, and without any appreciable change of structure in the kidney. It is plain, also, that passive congestion of the kidney produced by disease of the heart cannot be the sole cause of the renal change; for that change is sometimes well marked, though the heart has been unaffected. A man was admitted into the Middlesex Hospital under the writer's care, with acute articular rheumatism. It was his first attack, and he believed himself to have been a healthy man previously. The membranes of the heart were manifestly implicated; and as usual, though the cardiac symptoms were controlled, that organ was permanently damaged. After a short period this patient's legs began to be œdematous, and by degrees he became generally dropsical. His urine contained albumen, and was of a low specific gravity. At length he died: and traces of inflammation of the pericardium and endocardium were found, and the peculiar alteration of the kidney. In this instance, which is but a sample of many, the renal disease would appear to have been consequent upon the cardiac. Yet who can say that it had not pre-existed in a latent form, entirely unnoticed, as it daily is, by the patient?

The question is surrounded with difficulties, and we have not yet data sufficient for its solution: but in order that it may be solved, these difficulties require to be plainly stated, and steadily contemplated.

Conversely, it may be asked, does the renal disease ever cause disease of the heart? That it may do so is, at least, very conceivable. The heart, no less than other parts of the body, will suffer from the deterioration that has been shown to take place in the blood in these cases. A sort of anæmia is produced; and it has been already explained that anæmia implies debility of the muscular texture of the heart, and tends to dilatation of its cavities; and the weak heart becoming irritable also, grows thicker as it labours. And this is the form of cardiac disease which has been found, in many cases, to be coincident with renal dropsy. By Dr. Bright's table it appears that, in 27 cases, no disease at all of the heart could be detected. There were 52 cases of hypertrophy, and of these no fewer than 34 were free from any trace of valvular disease: among the 34 there were 11 instances of disease affecting the aorta. Hence there were 23 cases in which no cause of hypertrophy and dilatation could be found in the heart itself, or in the aorta. The true cause may, therefore, be suspected to have been the renal disease, operating upon the muscle through the quality of the blood.

Where the heart as well as the kidney has undergone organic change, the disposition to dropsical accumulation will evidently be augmented: but what share these two organs respectively possess in such cases in producing the dropsy it is very difficult, and practically not very important, to determine.

Pain or tenderness of the loins is sometimes an accompaniment of the renal disease; this symptom is more often present in the early than in the later stages of the malady. It occurred in one third of the 28 cases narrated by M. Solon. Dr. Gregory noticed it in the half of his patients.

Irritability of the bladder, or rather a morbid frequency of the call to micturition, has been spoken of by Dr. Bright and Dr. Christison as a common symptom in renal dropsy. It is a symptom, however, belonging to so many other disorders that, taken by itself, it has but little value. The writer has observed it to be extremely troublesome, the urgency being frequent and great, and the quantity of urine voided at each attempt quite trifling, in a case where it appeared to him (and to the patient, himself a physician) to be rather connected with distension of the peritoneum than with the condition of the urine; the pressure exerted upon the bladder by the surrounding liquid allowing it but little room to expand. Certain it is, that the symptom was always sensibly mitigated after paracentesis abdominis, which was several times performed.

The causes of the disease of which the outline has now been sketched, are obscure. It is clearly ascertained that its most obvious symptoms, in their chronic form, have, in very many instances, begun soon after the exposure of the body to wet and cold under unfavourable circumstances. But it is by no means certain—indeed, the probabilities preponderate on the other side—that, in these instances, the renal disease had not previously existed in its latent state. The influence of external agencies upon the excreting functions of the skin in exciting definite symptoms is beyond question.

It is certain, also, that what is called acute dropy (to be presently described) arises under similar circumstances of exposure, and is attended with a marked disturbance of the functions of the kidneys. And chronic renal dropsy has sometimes been noticed as occurring in persons who had previously suffered, and had apparently recovered, from the acuter form. Are we not warranted in supposing that the recovery was imperfect in such cases?—that the kidney had sustained irretrievable injury?—and that the disease, although under treatment, or by lapse of time, it had become tranquil or latent, was ready again to give indications of its existence upon any repetition of its exciting cause?

The possible dependence, in some cases, of the renal disease upon disease of the heart has been already noticed.

Again, it is matter of common observation that intemperate habits have

often preceded the development of the disease. Yet we conclude that intemperance is rather a predisposing than an essential cause, from the fact that the complaint is not unknown among children, and other persons whose manner of life has been strictly temperate. A marked example occurred lately to the writer in a young girl, fifteen years of age, who had not menstruated. And this leads to another remark; namely, that dropsy with albuminous urine has been observed not unfrequently to follow a sudden check or suppression of the catamenia. In a few instances, it has seemed to owe its origin to blows received upon the loins, or to extreme fatigue.

The disease occurs at all ages; less often, however, in extreme youth, than afterwards. Sabbatier records, that he saw, while in the service of M. Baudelocque, a young infant affected with anasarca and albuminous urine. The first case described by M. Solon, is that of an infant, seventeen months old, in whom similar symptoms appeared shortly after exposure to cold and wet. In 1838, a boy between five and six years old, anasarcous, and passing bloody and albuminous urine, was in the Middlesex Hospital, under the charge of Dr. Wilson. M. Constant, in the *Gazette Médicale* for 1835, cites the case of a child of five years of age. And M. Rayer gives two plates, representing the kidneys of two children, the one five, and the other six years old, who both died of dropsy, with albuminous urine, the consequence of scarlet fever. In each of these, the changes described by Dr. Bright were well marked, and the bulk of the kidney was considerably increased.

It is certain, however, that the malady is much more common in adults; not, in all probability, because the system is more readily affected by it at one period of life than another, but because, as life advances, the circumstances which tend to produce or foster it become of more frequent operation, namely, intemperance, exposure to vicissitudes of temperature, fatigue, disease of the heart.

It occurs, probably for the same reason, oftener in men than in women.

Dr. Christison suspects, that the renal disease happens chiefly in persons of scrofulous habit; and he found it, in several instances, coincident with phthisis pulmonalis. The experience of the writer would not have led him to that opinion. M. Solon doubts whether the co-existence of pulmonary consumption and this renal malady is more than casual. And Dr. Bright states, that "the instances in which phthisis or any form of scrofulous or tubercular disease has been connected with the renal affection, have been decidedly rare."

The same author remarks, that disease of the liver did not occur in more than 18 of his 100 tabulated cases.

After all, the true character of the change that takes place in the kidney, as well as many points in the history of the disorder, remains yet to be discovered. What has been ascertained of its course and probable causes amounts to a presumption, that an undue accumulation of blood in the kidney, passing, perhaps, into chronic inflammation, is at the bottom of those structural alterations, of which the precise nature has not been made out. In some few instances, not numerous enough to disturb the general rule, the organ has been to all appearance sound and pervious by artificial injection, although the symptoms of the disease had been unequivocally pronounced. In many others, new matter appears to have been deposited in the gland, and injections penetrate the altered textures imperfectly or not at all. That the unnatural conditions of the urine depend in part upon a mechanical transudation of certain portions of the blood, which pass through the kidney unchanged as through an inert filter, seems more than probable. Mixed with urine we find serum; its albumen and its salts, diminishing the acidity of the mixture, or even rendering it alkaline; and in many cases the colouring matter also of the blood. As serous liquid oozes through the parietes of the vessels in other parts of the body, and thus becomes the fluid of dropsy, it is easy to imagine that the same process goes on in the kidney; and this conjecture derives support from the fact, that the large veins proceeding from the kidney have

often, in this complaint, been found obstructed by firm clots of blood. The natural function of the gland is imperfectly or partially performed; the change which it should effect upon the blood, by purifying it from urea, fails to be accomplished. The albuminous impregnation, and the other altered qualities of the urine when voided, may be explained either by supposing that the secreting power of the whole gland is interfered with, but not absolutely suspended, so that the urine is incompletely elaborated; or by supposing that portions of the gland remain sound and effective, and that true urine is formed by these portions, and mixes with the constituents of the blood, which pass mechanically through other portions of the kidney, already altered in texture, and spoiled, as to their office, by the disease.

That these views are merely conjectural, and that, even if admitted, they are insufficient for the thorough explanation of many of the phenomena which occur during the more advanced stages of this obscure disorder, is freely acknowledged. They are offered, however, in the desire of stimulating further inquiry. Attempts to confirm or to overthrow speculative hypotheses of this kind may lead, at length, to the discovery and establishment of the true pathology.

Acute or Febrile Dropsy.

It remains to trace the features of the active, acute, or febrile form of general dropsy, to which frequent allusion has been made in the preceding pages.

The more chronic varieties of anasarca have been shown to depend, in most instances, at least, upon pre-existing disease of the heart, or of the kidney. The febrile kind may take place in a person who immediately before was in sound health. But it is more nearly related to renal than to cardiac dropsy. Its pathology has already been explained. The disease sets in suddenly, and with violence. In most cases it will be found that the patient had recently been exposed to the influence of cold, under unfavourable circumstances; whereby the play of some large secreting organ had been suspended, or materially checked. Hence, as was formerly shown, the retention of an undue quantity of serous liquid in the blood-vessels; hence, again, a disturbed and febrile condition of the circulating system; a gush of serosity soon takes place from the distended capillaries, and the whole cellular tissue of the body, and perhaps some of its serous bags also, are inundated.

The occupation of the cells by liquid is too rapid to be accounted for by the mere detention of the serosity ordinarily exhaled. These are cases to which the term *effusion* is properly applied.

In very many of these attacks, as was observed before, some internal organ suffers acute inflammation, denoted by its peculiar signs. But this is an accident — a coincidence. The dropsy is not the effect of the inflammation. This we know, because inflammation of the same organs is continually happening under other circumstances, without producing dropsy. It is not (for reasons formerly assigned) inflammation of the universal cellular tissue. Both the effusion and the inflammation (when inflammation occurs) are the common result of one cause. But it is important to bear in mind, that when mere dropsy ensues, there is always an approach or proclivity to inflammation. The analogy between dropsy and inflammation is here strongly marked. We have a full hard pulse, flushed cheeks, hot and dry skin, thirst, and furred tongue; smart fever, in short, and even some tenderness of the abdomen and other parts that are dropsical. These parts, it may be presumed, have not yet learned to bear, without resenting, the unwonted tension caused by the included water. The œdematous limbs also resist pressure more, pit less completely and easily, than in the chronic forms of anasarca.

The urine, in febrile dropsies, is scanty and deep-coloured; brown, more or less turbid, like muddy beer. It is full of albumen also, and its specific gravity is somewhat diminished. Often it deposits a brownish or black sediment, consisting of small black grains; and sometimes it is red; either ap-

pearance evidently resulting from an admixture of the colouring matter of the blood, more or less changed. These are the phenomena that constitute the link of alliance between febrile and renal dropsies.

It is often stated, as one circumstance by which the acute form of dropsy may be recognised, that the face is the part that first becomes œdematous. The eyelids are puffy and stiff; and the patient, on awakening, opens his eyes with difficulty. The truth seems to be, that the effusion is general and copious enough to be early perceptible. A slight degree of fulness of the subcutaneous cellular tissue of the face and neck, alters strikingly the character of the features; and when rapidly brought about, forces itself upon our attention. Other parts also escape immediate notice from being covered. In the slower forms of general dropsy, the detention of liquid is equally general; but being, at first, very slight in amount, and the patient not being confined to bed, it is not perceived until it has accumulated, under the influence of gravity, about the ankles.

In these cases, the first injurious impression is made upon the surface of the body, and the functions of the skin suffer. The circumstances under which such dropsies arise, have been sketched already. A man is somehow exposed to the noxious operation of cold, while hot from bodily exertion, exhausted through fatigue, and rapidly losing his heat by perspiration. Sometimes a large draught of cold drink, taken in that condition, seems to be the immediate exciting cause of the subsequent mischief. Sometimes it is mere cessation from the previous exercise, or sleep indulged, while the external agency of cold continues. The patient soon, perhaps on waking, becomes sensible of a chill; feels ill and uncomfortable; and within twenty-four or forty-eight hours, feverish disturbance is set up; the respiration is embarrassed; vomiting and diarrhœa not unfrequently occur; and the anasarcous effusion commences. The profuse perspiration was checked; that large proportion of liquid excretion, which should pass outwardly through the integuments of the body, is retained and diverted; and the healthy working of the circulation is violently interrupted.

That the functions of the kidneys, which are in so great a measure complemental of the functions of the skin, should sustain a proportional derangement, is what we might expect; and the altered qualities of the secretion, the bloody or albuminous condition of the urine, testify, invariably, the strain which these organs undergo. Sometimes, though not often, death is the early result of the attack, and it is usually preceded by an extreme deficiency, or an absolute suppression of the urinary secretion, and by coma. In all the fatal cases of febrile dropsy that have fallen under our observation, the kidneys have been found large, of a dark chocolate or purplish red colour throughout, turgid with blood, that seemed to be venous. We regard these appearances as being evidences of excessive congestion, rather than of inflammation, because neither the ordinary and striking symptoms of nephritis, nor the unambiguous products of inflammatory action, are usually observed in such cases. We have been informed however, upon good authority, of one instance in which coagulable lymph was found effused in the pelvis of the kidney.

When the disease does not prove fatal at once, the dropsical and other symptoms give way, either spontaneously, or under the treatment to be hereafter described. But there is much reason for thinking that, unless the overcharged system be speedily relieved, the germ of future and progressive disorganisation of the kidneys may be sown. Febrile dropsy, and acute renal dropsy, may be considered, without much risk of error, as convertible terms.

Dropsy following Scarlet Fever.

The dropsy which is apt to arise as a sequela of scarlet fever (and occasionally, but rarely, after measles) belongs to this class of febrile dropsies. It appears to have no relation, or, if any, an inverse relation, to the violence and danger of the preceding fever. It is much more common after a mild,

than after a severe disease. This, in all probability, is owing to the circumstance, that less care and caution are observed in the milder cases, during the dangerous period of desquamation and convalescence; a period more dangerous in that form of scarlatina, than any other. In the graver cases the convalescence is slower, more doubtful, and accidental or careless exposure to cold is more guarded against, or takes place later; whereas, in the milder disease, the patients are apt to go out, while the new cuticle is still forming. In carefully tracing the histories of dropsy, succeeding to scarlet fever, it will almost always be found, that the fever had been trifling; that the patient considered himself well, or nearly so, and had heedlessly encountered a cold or damp atmosphere, so soon as he felt himself strong enough to leave the sick chamber. Plenciz, who has written well on this subject, remarks, that those patients who have had great desquamation of the cuticle, are the most liable to the dropsy; that it is more frequent in winter than in summer, and in such as are early exposed to the open air, after having passed through the fever, than in those who remain longer at home. When the desquamation is over, and the new surface has become in some degree hardened, the peril is past. According to the observations of Dr. Wells, the dropsical symptoms commonly show themselves on the twenty-second or twenty-third day after the commencement of the preceding fever. They have been known to begin as early as the sixteenth, and as late as the twenty-fifth day. When no dropsy took place before the end of the fourth week, Dr. Wells always ventured to state that it was no longer to be dreaded.

The dropsy is seldom observed, except in children and young persons. The age of the oldest patient that Dr. Wells had known to be so affected, was seventeen. Of ten instances of the disease seen by Dr. Blackall, six occurred in children not exceeding the age of ten, and two others in persons who were respectively twelve and sixteen years old.

We cannot infer, from this, that the susceptibility of this dropsical condition lessens as years increase. The greater prevalence of this variety of dropsy in early life has no direct relation to age as a predisposing cause; any more than the comparative infrequency, at the same period, of renal dropsy unconnected with scarlatina. The fact is explained by the accidental peculiarities of the antecedent disease. The contagion of scarlet fever is active and widely diffused. Few children escape its agency. Few are capable of taking the disorder a second time. It follows that scarlet fever is rare in adult life; and as dropsy succeeds that disease in a very limited number of instances only, dropsy arising in connexion with scarlet fever must, at the adult age, be still more uncommon. Yet it is not unknown. One of Dr. Blackall's ten patients was thirty, another forty-two years old. Both of these were women.

In this variety also of febrile dropsy, the urine is very constantly troubled, bloody, albuminous; and it is an interesting fact, that the chronic form of renal dropsy, manifesting itself at some distance of time, has been distinctly traced back to its source in the acute anasarca, immediately consequent upon scarlet fever. The sequence has occurred, in all probability, much oftener than it has been noticed. There is scarcely room for doubting that the series of organic changes in the kidney, described by Dr. Bright, do frequently date their origin from an attack of febrile anasarca; and in proportion as facts, accurately observed, accumulate on this subject, the chain of connexion becomes more clearly visible between acute febrile dropsy, dropsy succeeding scarlet fever, and chronic renal dropsy. It is evident, indeed, that the two first of these three are, in their character and exciting causes, identical, the only difference between them consisting in the remarkable predisposition towards the second, impressed upon the body by the preceding exanthema. Both of them, again, are in many instances initiative of the third.

It is natural, therefore, to expect that in the variety of febrile dropsy now under consideration, as well as in the variety previously described, inflammation should be common, and evidenced by its unequivocal effects. And it is so.

But the dropsy, we are persuaded, has no essential connexion with common inflammation of any part, unless the state of the kidney be of that kind. We have examined the body very carefully in fatal cases, and found the serous cavities full of clear liquid, without a trace of redness or of any of the unmistakable products or events of inflammatory action.

The earliest threatenings of this formidable complaint demand attention. It is usually preceded, for a day or two or longer, by languor and peevishness; frequently by nausea and vomiting, and a costive state of the bowels. The pulse in the outset has been found slow, and beating with irregular intervals; but it afterwards becomes frequent. The urine at first is scanty, as well as altered in appearance. The face becomes pale and chuffy. Sometimes, as the disease proceeds, violent headach, dilatation of the pupils, convulsions, or palsy, denote effusion within the head. Much more frequently the pleuræ are the seat of the internal dropsical accumulation, and dyspnœa is a prominent symptom. Ascites, to any considerable amount, is rare.

Treatment of general dropsy. The first and chief remedy in acute or febrile drospy is venesection. This is suggested by the existing fever—for allaying which, bloodletting is an approved expedient—as well as by the immediate physical cause of the dropsical effusion, namely, the plenitude of the bloodvessels, resulting from defective or suppressed excretion. And a still more satisfactory reason for the adoption of this measure is, that it has been found by experience to be efficacious, alleviating in a remarkable manner the uneasy feelings of the patient, and leading, in many instances, to a speedy diminution of the dropsy. In order to avert as far as possible the danger of permanent injury to the congested kidney, it will always be right to take blood from the loins by cupping. The same object will be indirectly promoted by applying warmth to the surface of the body, and by administering diaphoretic medicines. The patient may be put into a warm bath, and take frequent doses of the liquor ammoniæ acetatis, and of James's or Dover's powder.

In some cases, diarrhœa or dysentery attend the attack. When the bowels are undisturbed or costive, an active purge should be given at the outset. After its full operation, or if the motions are already frequent, slimy, or sanguinolent, calomel and opium, frequently administered, have often excellent effects in allaying the intestinal irritation, and restoring the disordered functions of the skin.

If the urine be very deficient in quantity, and stupor or convulsions come on, it will be proper to abstract blood by means of cupping-glasses from the neck or temples, as well as from the loins. Under these circumstances, the disease resembles, or becomes, the Ischuria renalis of authors. If the secretion from the kidneys can be restored, the present security of the patient is accomplished. Stimulant diuretics, in large doses, have been recommended for effecting this: such as a grain of the powder, or a drachm of the tincture of cantharides, frequently repeated. The propriety and safety of this plan of treatment are very doubtful; since, so far as we understand the mode of operation of these stimulating diuretics, they act by determining an increased quantity of blood to the kidney, which in these cases is already overcharged with blood. It is better, in our opinion, to abstain from diuretics altogether.

These measures, diligently put in force, are generally successful. The dropsy disappears, and the febrile disturbance subsides. But the qualities of the urine should be carefully noted for some length of time after convalescence seems established.

Prevention is at all times better, and often much more practicable also, than cure. It seems probable that by the observance of sufficient caution, the supervention of dropsy after scarlet fever might always be obviated: and the prudential expedients are simple and easy. The patient should confine himself to the house, and sedulously avoid all exposure to cold and wet, for a full month after the accession of the disorder in the milder cases, and still longer when the fever has been more severe, or more protracted.

In chronic general dropsy of a purely cardiac origin the kidneys, being sound, offer the most convenient and eligible channel for carrying off the accumulated water. Diuretics, therefore, which in the preceding form of the disease were objectionable, rank in this among the most important of our curative expedients. When they fail to act, or prove insufficient for the purpose sought, we may have recourse, the state of the bowels permitting, to drastic purgatives.

Diuretic medicines are notoriously of most uncertain operation; sometimes completely answering our wishes, oftener perhaps disappointing them altogether. When the urine is strongly acid, and deposits, on cooling, a sediment like brick dust, it will be well to try, at first, the alkaline diuretics, and particularly the salts of potass. Nitre, added to the common saline draught, or a combination of the acetate and carbonate of potass: or the bitartrate in small doses: or the liquor potassæ. The tincture of squills also has appeared, in the experience of the writer, to correct this superacid and turbid condition of the urine, while it increased its quantity.

Digitalis sometimes promotes, in a remarkable degree, the flow of urine; and this, according to our judgment, is its most useful and manageable property. Small quantities of the tincture, or of the infusion, may be added to other formulæ. Or the powdered leaves may be combined in pills. But one of the best modes of exhibiting digitalis for this purpose is to give larger doses of the infusion, half an ounce, for example, in some cordial water, at intervals of four or six hours, till three doses have been taken in succession, and then to pause and note its effects; and to repeat the three doses or not, accordingly.

The spirit of nitrous æther, and the compound spirit of juniper, have both well-marked diuretic properties, and may with propriety be added to most of the liquid formulæ for augmenting the discharge of urine. And as vehicles for the more active or concentrated ingredients, those vegetable infusions or decoctions should be chosen which are reputed to possess similar virtues; such as the decoction of broom-tops, or of juniper berries, or of winter-green, or the infusion of buchu.

Squills, turpentine, the tincture of cantharides, are drugs of a more stimulant nature, more peculiarly adapted to cases in which there is no febrile disturbance, and the kidneys are obstinately inactive.

Sometimes a combination of diuretic drugs proves more efficacious than larger doses of any of the ingredients administered singly. The operation of some of these combinations is undoubtedly quickened and exalted, in many instances, by the addition of mercury. A fluid drachm of the officinal solution of the bichloride in each dose of a mixture, or small quantities of calomel or blue pill when the medicines are given in the solid form. A very useful pill of this kind, much recommended by the late Dr. Baillie, consists of five grains of the pilula hydrargyri combined with one grain of the dried powder of squills, and half a grain of the dried powder of digitalis, to be given twice or thrice a day. Dr. Baillie states that squills and digitalis are by themselves much less effectual than when combined with mercury.

In choosing purgative drugs to aid the effect of diuretics in carrying off the dropsical fluid, or to take the place of them when they fail to act, we select those which produce copious discharges of serous evacuations from the bowels. A combination of jalap and cream of tartar has been long and deservedly esteemed for its excellent operation in this way. Gamboge is also a good cathartic. It may be given two or three times daily in grain or two-grain doses, with a drachm of cream of tartar suspended in two ounces of peppermint water. Or half an ounce of cream of tartar, mixed in six ounces of peppermint water, may be administered, in one dose, every morning. The croton oil and elaterium are still more powerful evacuants of serous liquid from the intestines. One or two drops of the former, and from a quarter of a grain to a grain of the latter, will be about a proper dose. It is astonishing how much relief to the feelings of the patient, and how great a diminution of the dropsical symptoms,

are sometimes obtained by these violent cathartics. Patients will earnestly beg for a repetition of them, even when their operation is for the time attended with considerable pain or sickness, and general distress.

In addition to these measures for the removal of the collected water, attention must be paid to the actual condition of the heart. If the dropsy has been the result of anæmia, or of general cachexy of the system, we must endeavour to strengthen the patient, and to repair his impoverished blood, by nutritious food, and tonic medicine, and especially by the administration of steel. Preparations of iron have also an exceedingly good effect, oftentimes, in those cases of organic disease of the heart which consist in dilatation and tenuity, and consequently weakness of its muscular parietes.

On the other hand, if there be violent palpitations of the heart, with a strong and heaving impulse, we may appease the excessive action, and afford sensible comfort to the patient, by applying leeches, from time to time, to the precordia.

In the renal form of chronic general dropsy, whether pure or mixed, the treatment is less accurately ascertained, and partakes of the imperfect character which marks, as yet, nearly all the rest of our knowledge concerning the complaint.

Whenever (in renal dropsy) acute symptoms and febrile disturbance occur, much relief may be expected from the abstraction of blood. When drawn from a vein, it usually shows the buffy coat. The existence at the same time of pain in the loins would indicate the propriety of applying cupping-glasses to that part. Nevertheless, the impoverishing effect of the disease itself upon the blood, and the probable dependence of some of the more distressing and alarming symptoms upon the serous condition of the circulating fluid, as well as the increased facility with which the altered blood may transude outwards — these are circumstances which should induce a cautious practitioner to have recourse to this heroic remedy only when it is clearly demanded.

One definite object, in the renal as well as in the cardiac variety, is to remove the dropsical fluid, from which the danger and the suffering often chiefly proceed. But it is a more nice question, when the kidney is involved in the disease, how this is to be accomplished. Can we, with the same safety as in cardiac cases, employ diuretics? It has been thought that we cannot. As the primary state of the kidney is often, if not always, one of congestion; as there is reason to suspect at least that the morbid change in progress is of the nature of, or allied to, chronic inflammation; it has been feared that direct diuretics, such as are calculated to cause, keep up, or augment congestion of the kidney, or to stimulate and irritate that organ, would be likely to accelerate the disorganising process of which it is already the seat.

Now, although these views are partly hypothetical, and certainly are not yet established by conclusive proof, it is better, when we can, to observe the caution they suggest. It is better to endeavour to empty the distended cavities, and to relieve the loaded cellular tissue, through the bowels, or the skin. Sometimes, however, more often indeed than in cardiac dropsy, we have the untoward complication of irritable bowels, or habitual diarrhœa; and then drastic cathartics are inadmissible. But when this complication is not present, they are eminently useful.

Great benefit is sometimes derived from measures that act powerfully or steadily upon the cutaneous transpiration, and especially from warm or hot-air baths. The hot-air bath is, in many respects, to be preferred to the common warm-water bath, and even to the vapour bath. Upon the principle of heterogeneous attraction, the escape of the liquid from the surface of the body will be more promoted by a dry heat, than by water artificially raised to a high temperature, or even by an atmosphere made moist as well as hot by vapour. The risk, moreover, of exposure to cold, and the inconvenience and hazard of fatigue, are much less; for the hot-air bath can be brought, with but little trouble or expense, to the patient as he lies in bed. No better apparatus for this appliance of hot air to the body has been devised than the *sudatorium*,

described by the late Dr. Gower in one of his little tracts, entitled *Auxiliaries to Medicine.* It has been in use at the Middlesex Hospital since its introduction there by that physician; and of its efficacy the writer has had abundant experience. But in renal dropsy he has seldom found the relief thus obtained to be of itself sufficient, or of more than temporary duration. Still it is an expedient that should never be neglected; and, in pursuance of the same indication, diaphoretic medicines are to be diligently exhibited. Dr. Osborne states that when the renal disease has been uncomplicated with other organic mischief, he has always found the dropsy disappear, upon the re-establishment of the functions of the skin.

These measures failing, as they often will, and diarrhœa forbidding the use of drastic purgatives, or drastic purgatives and diaphoretics together proving insufficient, we must, even in renal dropsy, since the mere dropsy is both distressing and dangerous, choose the least of two evils; or, rather, we must incur the risk of one possible and contingent evil, for the chance of obtaining what, if obtained, is a certain and positive benefit; we must endeavour to remove the dropsical accumulation by means of diuretics, whether these accelerate the progress of the disease in the kidney or not.

Such diuretics therefore are, in the first instance, to be selected, as seem the least likely to stimulate the kidneys injuriously. Cream of tartar has been found to be one of the most certain and useful; digitalis also is esteemed safer, and therefore more proper for this purpose than many others: and the simultaneous administration of these two has perhaps the surest effect of all.

When diuretic medicines prove efficient, they are commonly of great service, by reducing the dropsical swellings. But they are apt to be very capricious and disappointing; and we have tried, in renal dropsy, every known form and combination of diuretic, without augmenting the secretion of urine. Sometimes, though a plentiful discharge takes place through the kidneys, no impression is made upon the dropsy.

It is yet an unsettled question whether mercury be advisable, or even admissible, in these cases. The current of opinion sets against it, perhaps too strongly. It has been observed that salivation is apt to be produced by a small quantity of this drug, and to be unusually troublesome and severe, without bringing any corresponding advantage. Dr. Farre holds that mercury has the property of rapidly destroying red blood; and if so, it is to be regarded rather as an ally, than an antagonist, of this malady. On the other hand, some patients have appeared to recover altogether, after passing through such furious salivation. One of the reputed virtues of the mineral is, that it promotes interstitial absorption,—a property which the usual changed state of the kidney in renal dropsy would seem to render valuable.

When internal remedies prove ineffectual, and outward applications to procure sweating miss their aim, it becomes necessary to look to those mechanical expedients which (in either form of the disease) may often afford ease and prolong life, and which sometimes, perhaps, may achieve a cure.

The tense and stretched integuments occasionally give way, the cellular tissue sloughs, and from the breach thus made water wells copiously forth, and great relief ensues. Sometimes, though rarely, the whole of the accumulated fluid has so escaped, and the dropsy has not reappeared. The sore has healed, and the natural cure has been complete.

This spontaneous mode of draining off the liquid has been imitated by art. For the unwieldy legs become painful as well as cumbrous; the integuments threaten to inflame or mortify; and if we can diminish the tension by removing a portion of the included fluid, we avert or lessen this danger. Moreover the penis and scrotum become, in many cases, so anasarcous as to increase materially the distress of the patient. The scrotum enlarges to an enormous size, so as to prevent the approximation of the thighs, and to render it impossible for the patient to lie on either side. And the swollen integuments of the penis impede the comfortable excretion of the urine, which is spilled upon the thighs

and tumid scrotum, and the surface on which it falls becomes erythematous and raw, to the grievous aggravation of the patient's sufferings.

Now seeing that vesications sometimes form upon the dropsical limbs, and give vent, in some degree, to the fluid, these have been imitated, and artificial blisters excited. But they are highly dangerous, leading often to gangrene of the surface thus inflamed. Not many years ago it was the custom to make incisions in the œdematous legs, by means of lancets: these gashes seldom healed again, but became at length sloughing sores, and not unfrequently hastened the dissolution of the patient.

A great improvement upon these expedients is the modern practice of acupuncture, which consists in perforating the integuments here and there by a fine needle.

It is surprising how much fluid may be let out in this way, to the great alleviation of those symptoms which result from its accumulation. The liquid trickles rapidly forth, and will soak sometimes through the bed, and form a pool on the floor of the chamber. In one case, attended by the writer, the limpid fluid which thus oozed from a puncture in the thigh was caught and collected in a glass, by means of a little gutter of oiled silk. It was found that 90 minims, or a fluid drachm and a half, escaped in a minute, which is at the rate of 11¼ ounces in an hour; and this drain went on for upwards of four hours.

The surface on which these punctures have been made, sometimes becomes red, erysipelas supervenes, which is difficult to arrest, and the patient sinks. In a certain proportion of these cases the same event would probably have occurred, even although no punctures had been made, from mere tension of the integuments, and the progress of the disease. When these appearances present themselves, the affected limb should be kept in the horizontal position, and strips of linen, wetted with a solution of Goulard, applied to the inflamed surface.

Under the old system of incisions, it was found (and reason would teach us to expect this) that there was more hazard of sloughing when they were made on the legs, than on the thighs. This risk is much less when needles are used. But the punctures are not to be made without attending to certain precautions. They should not be too near each other: an inch and a half, at least, should intervene between them. Neither should they be too numerous, nor too deep. The depth must depend upon the circumstances of the case, and especially upon the place of the punctures. The needle should not be pushed so deep as to penetrate or wound any fascia, for the danger of subsequent inflammation would thereby be increased.

The peritoneum may at the same time require to be emptied in the same mechanical way, by help of a trocar. This should not be done, however, before the symptoms absolutely call for it, nor until all other means of dispersing the water have been tried in vain. The circumstances that warrant or demand the performance of the operation, the dangers that attend it, and the means of obviating those dangers, must necessarily be treated of under the head of Ascites, to which upon these points the reader is referred.

By whatever means we may succeed in getting rid of the dropsy, there will remain (except in the comparatively few cases that are unconnected with organic disease, and depend simply upon debility or anæmia) the necessity for guarding against its return, by remedial measures addressed to the faulty organs. We may sometimes keep the disease of these organs in check even when we cannot cure it.

In cardiac dropsies, besides the medicines already specified, undeviating temperance and regularity of life must be enjoined, and the patient must carefully and always avoid all active motion or exertion of the body, and all strong emotion of the mind; whatever, in short, might tend to hurry the circulation. These cautions can scarcely be enforced without plainly showing the patient the danger he will incur by their neglect.

In the renal variety of the disease, in addition to the appropriate remedies heretofore enumerated, particular attention must be paid to the avoidance of all exposure to cold and vicissitudes of the weather, and to keeping the surface of the body warm. Such patients should constantly be clothed in flannel from head to foot. Residence in a warm climate may be strongly recommended to those who are able to choose their place of abode. Some benefit may also be hoped for from counter-irritation — blisters or issues to the loins.

The diet in the chronic forms of the disease should be nutritive, but unstimulating. M. Solon suggests that if, in the renal cases, urea be detected in the blood, the patient should be restrained from too animalised a diet. Dr. Budd has had the same thought, and has put to the test, in the Hospital-ship Dreadnought, the utility of withholding all articles of food that contain azote. We have found this restriction entirely useless [in one case in which it was fairly enforced.

Much unnecessary penance used to be imposed upon dropsical persons by stinting their allowance of drink. It was natural to suppose that the accumulation would increase in proportion to the quantity of liquid swallowed; but experience has shown this opinion to be erroneous, and *crescit indulgens sibi dirus hydrops* has ceased to be more than a poetical doctrine. The patient may safely be allowed to exercise his own discretion in this respect. When the peritoneum is full, distress is apt to ensue upon the distension of the stomach by drinks, but this source of suffering is soon discovered and avoided. The patient is better able than his physician to judge which evil is the greatest, — the torment of unslaked thirst, or the discomfort that may be produced by its immoderate indulgence.

CEREBRAL DROPSY, OR CHRONIC HYDROCEPHALUS.

Origin of the disease. — Its progress. — Examples. — Mode of treatment.

UNDER the generic name of Hydrocephalus are included two very different diseases. Acute hydrocephalus is an inflammation. Chronic hydrocephalus is a dropsy. Acute hydrocephalus is inflammation of the brain, or of its membranes, occurring in children. In adults the same disease is usually called phrenitis, or encephalitis. Sometimes it is, and sometimes it is not, attended with the effusion of water into the cavities and cells of the brain. The name, therefore, is obviously a bad one, for it specifies a condition which is not constant, and it does not express the true nature or essence of the disorder. It is, however, only with *dropsy* of the cranial cavity, or the chronic hydrocephalus of authors, that we are here concerned.

Chronic hydrocephalus is especially a disease of childhood. It almost always commences in early life. Very often it exists before birth. But the disease is not confined entirely to the first period of existence; for, though the greater number of those who are affected with dropsy of the brain either recover or die during their infancy, a few survive, bearing their complaint to the adult period, and even to old age.

Dr. David Monro relates the case of a hydrocephalic girl, six years of age, whose head measured two feet four inches in circumference. Gölis mentions a person afflicted with this disease, who lived to be twenty-seven years old; Aurivill another, who reached forty-five years; and the celebrated Gall speaks of one who attained his fifty-fourth year in the same condition. Many other instances of the same kind, and of still greater age, are on record. In most of the anatomical museums of this country a cast is to be seen of the enormous head of J. Cardinal, who died in Guy's Hospital in the year 1825, being then nearly thirty years old.

When the disease befalls the fœtus, and the cranium is enlarged, it presents an obstacle to the ready passage of the child into the world. Hence, the moment of birth proves, to many of these infants, the term of existence. *Nascentes moriuntur.* The pressure of the maternal pelvis is fatal; or the diseased head bursts, or is punctured to save the life of the mother; the contents of the crushed skull escape, and the empty shell collapsing passes through the natural outlets. But, in many cases, the dropsical cranium is expelled entire and unhurt, and the infant lives for a longer or shorter period. Many, again, are born apparently healthy; but soon, in a few days, or after some weeks or months, their heads are observed to enlarge with a rapidity quite disproportioned to the growth of the other parts of the body; and the enlargement is progressive.

What are the effects of this undue increase of bulk upon the outward form of the head? What are the precise conditions of the parts contained within the cranium? How do those conditions affect the three great functions of the brain, — sensation, thought, and voluntary motion? Have we any means of arresting or lessening the increase of size, or of curing the disease, or of preventing its occurrence? These are questions of great interest, which we shall proceed to consider.

The intervention of the membranous partitions, called fontanelles and open sutures, between the un-united bones of the skull, allows the pressure occasioned by the gradual accumulation of water within the cranium of the fœtus, or of the young child, to modify the external shape of the head. These membranous interspaces are unnaturally wide, and occur in parts where they are not found in healthy children of the same age. The process of ossification goes on as the surface to be thus made solid increases: but the bones are extremely thin. Little islands of bone appear in seas of membrane. By degrees, if the child continues to live, the proportion of membrane to bone becomes less and less, and, at length, the whole braincase is hard, and firmly closed up, its surface exhibiting an unusual number of joinings; there are many *ossa triquetra.*

Meanwhile the direction and relations of the loose and yielding bones are altered. The os frontis projects, so that the forehead, instead of slanting a little back, rises perpendicularly, or even slopes outwards and overhangs the brow: the parietal bones bulge, above, towards the sides; the occiput is pushed back; and the head becomes long, and broad, and deep, but flattened at the top. This is the most ordinary result. In some instances the skull rises upwards in a somewhat conical form, like a sugar-loaf. Not unfrequently the whole head is more evidently misshapen, the two sides being unsymmetrical. Some of these varieties of form are fixed and connate, and others are owing, probably, to the kind of external pressure to which the head has been subjected.

While the skull may be rapidly enlarging, the bones of the face grow no faster than usual, perhaps not even so fast: and the disproportion that results gives a singular and peculiar expression to the unhappy beings who are the subjects of this calamity. They have not the usual round or oval face of childhood: the forehead is broad; and the outline of the features tapering towards the chin, gives a sort of triangular character to the visage. The great disproportion between the head and the face assists the diagnosis of the disease; and would serve to distinguish the skull of a hydrocephalic child from that of a giant.

When death allows us to explore the physical causes of these singular alterations in bulk and figure, we find that they commonly proceed from the pressure of accumulated water: the complaint is manifestly a dropsy. But the situation of the water, and the condition of the brain itself, are subject to some curious varieties.

In a certain number of cases the brain is incomplete; deficient in some of its parts, or even wanting altogether; that portion of the cranial cavity which should contain cerebral matter being filled up by a thin transparent liquid. From some unknown cause acting during the period of intra-uterine life, the

progressive formation of the brain has been stopped. Marks of imperfect development are often visible in other parts of the same infants; in the fissured palate, for instance, the cleft lip, or the bifid spine. It is in cases of this kind, generally, that the skull, unnaturally small perhaps, is pinched up into a conical peak, and has considerable thickness. They are evidently hopeless cases; although to the physiologist they are subjects of considerable interest, they have none for the practical physician.

But in the majority of instances, when the infants survive their birth, the liquid is contained in the central cavities, or ventricles of the brain, which are expanded into one. The convolutions are unfolded, and the cerebral matter is spread out into a hollow sphere; the irregularities of the surface have disappeared; the whole of the brain is smoothly stretched in a thin layer immediately beneath the bones and their connecting membranes, and surrounds the enclosed liquid like a bag. Less frequently a different state of matters is seen: the liquid, instead of being included within the cerebral substance, lies in contact with the dura mater; while the brain, perfect in all its most important parts, is at the bottom of the cavity. The difference, however, is more apparent than real: the two conditions are originally and essentially the same; only that, in the one case, the solid parts that lie around the ventricles gradually expand as the fluid slowly increases, much as an air-balloon expands in proportion as gas is introduced within it; while, in the other case, the seams or commissures (as they are technically called) that join the hemispheres of the brain together give way, or are from the first deficient, and the ventricles and the general sac of the arachnoid come to form one huge cavity: the hemispheres are turned aside, or folded back, so that the surfaces naturally central look upwards, and form apparently the outer surface of the brain. Even this condition is not incompatible with prolonged life, and the manifestation of intellectual phenomena.

For convenience of description, the liquid that constitutes dropsy has frequently been spoken of as *water*. Water forms, indeed, the main bulk of it, but, as has been previously explained, the liquid is something more than mere water; like the serum of the blood, it contains certain saline ingredients, and a portion of animal matter. The liquid of hydrocephalus approaches more nearly to pure water than that of any other form of dropsy, containing a very small quantity only of animal matter or of salts. It does not coagulate when heated.

Some of the consequences of this distension of the brain and skull with watery fluid are simply mechanical. The large unwieldy head is too much for the muscles of the neck to sustain without fatigue, or even, when they are unassisted, to sustain at all. The child walks gingerly and carefully, like a person who poises a heavy load upon his head; or he holds and partly carries his head with his hands as one would steady and support a pail; or he reclines the weight of his burden upon the chair or table, as he sits.

Far more important effects of the disease are the changes produced in the immediate and principal functions of the brain. The child is soon found to be deaf, or blind, or palsied in one or more of its limbs, or idiotic, or all these: *i. e.* the special senses, the power of voluntary motion, and the mental faculties are apt to be defective, or perverted. But in some of the individuals who, with excessively large heads, have yet numbered many years of existence, the intellect and the senses have remained, if not entire and perfect, yet still sufficiently effective to answer the common wants and purposes of social life. The moral emotions strong, the feelings lively and correct, the memory tolerably retentive, the reasoning powers respectable.

The child seen by Dr. Monro is described by him as being "as lively and sensible as most of her age," and as "having a strong memory." Dr. Bright records the following particulars, some of them very curious, of his patient, Cardinal. He was born in 1795. At the time of birth his head was only a little larger than natural, but it had a pulpy feel, as if it were almost destitute

of bony matter. A fortnight afterwards it began to increase rapidly, and when he was five years old, it was but little less, according to his mother's account, than when he died. He could not walk alone till he was nearly six, and then only on level ground; and if he attempted to run or stoop, he fell down. He was sent to school when he was about six, and soon learned to read well, and to write tolerably; but writing he soon gave up, because, as he was near-sighted, it obliged him to stoop, which he could not conveniently do. When a candle was held behind his head, or his head happened to be between the spectator and the sun, the cranium appeared semitransparent: and this was more or less the case till he was fourteen years old. About the age of twenty-three, epileptic fits began to show themselves; and after that, his health, which previously had been very good, began to fail a little. The ossification of the skull was not complete till two years before his death, the anterior fontanelle being the last part that closed. It has been mentioned that he was near-sighted, but he was very quick of hearing; his taste was perfect, and his digestion good. Dr. Bright states that his mental faculties were very fair, and his memory tolerable, but it was not retentive of dates. It was said that he was never known to dream. There was something childish and irritable in his manner, and he was easily provoked. He died at last of fever and diarrhœa. There were seven or eight pints of fluid within the cranium, in contact with the dura mater: at the base, or floor, of the skull, lay the brain, with its hemispheres opened outwards, like the leaves of a book.

How comes it that the cerebral functions are thus sometimes fulfilled, or go on so well, when the machinery through which the mental powers are manifested is so palpably and greatly deranged? How comes it that life, and especially the life of the mind, subsists at all? These questions open very interesting considerations. It would appear, from such cases as have been referred to, that the curious arrangement and collocation of the several parts of the brain is rather a matter of convenient package than of necessary relation. The pulp, which is the instrument of sense, and thought, and volition, is there, but it is disposed in an unusual shape. In neither of the two varieties that have been described as being compatible with prolonged existence, is there any necessary diminution of the cerebral mass. The brain itself, which forms a bag in the one case, and is split in halves in the other, has been found to weigh quite as much as a healthy brain at the same period of life. There has been no loss, therefore, of substance; the pressure has been gradual, and it has not acted injuriously through counter-pressure: no countervailing resistance has been furnished by the rigidity of the brain-case, and thus the unopposed distending force neither causes absorption of the cerebral pulp, on the one hand, nor, on the other, induces coma, or convulsions, or idiotcy, by its compression. The change in relative position is, moreover, the least at the base of the brain, where the nerves emerge, and the great vascular trunks are situate.

Most commonly, however, the mental and voluntary functions are maimed, or perverted; and these serious calamities make parents look at a large head, in a young child, with anxious solicitude. It is of some importance, therefore, that the practitioner who may be consulted in such cases should be aware that the head may be extravagantly large without dropsy of the brain, and without disease.

A mother brought her little boy just two years old to the late Dr. Sweatman, alarmed at the size of his head, which from the age of six months had been gradually increasing till it had become so large as, by its weight, to prevent the child from continuing long in the upright posture. The boy occasionally seemed uneasy, and then relieved himself by laying his head upon a chair. There was no other symptom of disease. He was active and healthy, though thin; had never squinted, nor had any fit or convulsion; nor was he subject to drowsiness or startings during sleep. His appetite was good, and all the animal functions properly performed. Dr. Sweatman asked Mr. Mayo to see the child with him in consultation. They both believed it to be a case

of hydrocephalus, but agreed in thinking that in the absence of symptoms it would be wrong to risk disturbing his digestive organs by active medicines. Half a year afterwards the child died of inflammation within the thorax. The head, which had not undergone any further enlargement, was examined by Dr. Sweatman and Mr. Mayo. It measured from ear to ear, across the vertex, 12 inches; from the superciliary ridges to the occipital, 13 inches; and in circumference, 21 inches. The anterior fontanelle, which was quite flat, measured across its opposite angles $2\frac{1}{4}$ inches by $1\frac{1}{2}$: the posterior fontanelle was completely closed, as was the frontal suture. There was no absorption of bone at any part; on the contrary, it was becoming thicker. The dura mater adhered with great firmness to the skull, and a layer of false membrane, as large as a crown piece, was found adherent to it at its upper and anterior part. Beneath the arachnoid at that part there was slight gelatinous effusion. In all other respects the organ was natural. The convolutions were perfectly distinct, and retained their proper rounded form. All the ventricles were empty, and not dilated. The surface of the medullary matter, exposed by different sections, presented unusual vascularity. The brain when removed from the body weighed within half an ounce of three pounds avoirdupois, and might have been taken for that of an adult; whereas the nerves arising from its base, and the medulla oblongata, were in size those of a child. (*Med. Gaz.*, vol. xv. p. 595.)

M. Scoutetten relates an example of the same kind which he observed in a child five years old. Its head was as large as that of a well-grown adult person. The skull was from a line and a half to two lines in thickness. The dura mater adhered firmly to the bone, and the cerebral mass exactly filled up the cranial cavity. The superior posterior part of the brain was developed beyond measure, so that to reach the ventricles it was necessary to make an incision nearly three inches in depth. There was nothing unusual to be remarked in the cerebral functions of this child: in respect of intellect, it was just like other children of the same age. It died of acute inflammation of the bowels.

These were cases of hypertrophy of the brain and skull; and the lesson which such histories convey is this: we are not to conclude that every child having a very large head is a hydrocephalic child. So long as there are no symptoms, we are not to intermeddle with such children, nor to risk the ruin of their health by the *nimia cura medici;* and we may comfort their parents with hope.

When (as sometimes happens) the brain is thus prematurely developed, but the capacity of the skull does not enlarge at the same rate, a peculiar and interesting form of disease arises; to which the name of *Hypertrophy of the Brain* has been assigned by the few authors who have noticed it. In these cases, the pressure to which the nervous pulp is subjected produces its ordinary consequences — epileptiform convulsions, coma, and at last death: and inspection of the encephalon shows that such pressure had operated; for the surface of the cerebrum is found dry and smooth, its convolutions flattened and forced so closely together that the sulci between them are almost obliterated, while the ventricles are even smaller, and contain less fluid than is natural.

We have seen that while the brain itself is gradually unfolded or its hemispheres are parted and turned aside, by the liquid accumulating within the cranium, the functions of the organ may suffer but little, so long as the yielding brain-case permits the expansion or separation of the nervous substance, without inordinate pressure. But as soon as undue pressure begins to be exercised, then arise morbid symptoms, or the defects that have previously shown themselves are aggravated. Hence that period of life becomes perilous when the skull, by the closure of its fontanelles and sutures, loses its capability of expansion.

The sutures have even been known, after close union, to open again to a considerable extent, under the augmenting pressure: and they may firmly

unite, while large portions of the walls of the skull remain membranous. (Baillie, *Trans. Coll. Phys.*, vol. iv.) A beautiful preparation showing this may be seen in the collection which belonged to the late Dr. Sweatman.

Indeed, although this complaint has been spoken of as being especially a disease of childhood, it does occasionally commence long after the sutures of the skull have permanently closed. Enlargement of the head in these cases is impossible, but this circumstance, and the symptoms it is apt, mechanically, to produce, form the only differences between the disorder as it affects the child and the adult. In both cases the cerebral functions become disturbed, and, at length, convulsions and coma close the scene. In both, a dropsical state of the ventricles of the brain constitutes, often, the only morbid change presented after death.

Treatment. Such, then, being a condensed account of this afflicting and formidable malady, can we ever accomplish its cure? Sometimes, experience tells us, we may: and at all times we must attempt it, for parents will cling to hope; and, in truth, there have been, under judicious management, a sufficient number of recoveries to forbid despair in any case, and to make it our duty carefully to employ those measures which have, occasionally, brought the disease to a favourable termination. Gölis even affirms, that of the cases which began after birth, and which he saw and treated early, he was fortunate enough to save the majority.

The cure may be attempted by internal remedies, or by external mechanical expedients, or by both.

The internal remedies by which most appears to have been effected, and from which therefore most is to be hoped, are diuretics, and purgatives, and, above all, mercury, which is believed by many to have a powerful influence in promoting absorption. Conjointly with these, the abstraction of small quantities of blood from the head by means of leeches has been found beneficial.

Gölis advises that calomel should be given in half-grain doses, twice a day; or, if that quantity should purge the patient too much, in doses consisting of only one fourth of a grain. At the same time he would rub a scruple or two of mercurial ointment, mixed with ointment of juniper-berries, into the head, every night. He keeps the head constantly covered also by a woollen cap. Infants require, he says, no other nutriment than good breast milk, while older patients should take a moderate quantity of meat. In mild weather they should live as much as possible in the open air. Under this plan of treatment, he asserts that he has known the circumference of the head decrease by half an inch, or an inch, in a period of six weeks, or three months; and that perseverance in this method has frequently, in his experience, been followed by perfect recovery, both of the mental and of the bodily powers.

In an interesting case which occurred in a boy fourteen years of age, after cupping, blisters, the blue pill, drastic purgatives, and the ordinary diuretics had failed, the late Dr. Gower suggested a plan which he had himself found successful in some similar cases, and which had first been followed and recommended by Dr. Carmichael Smith, who has recorded ten instances of recovery under its adoption. This plan was to rub down ten grains of crude mercury with about a scruple of manna, and five grains of fresh squills; to administer this as one dose; and to repeat it every eight hours. This dose was taken by the patient, three times daily, for nearly three weeks, without causing ptyalism. Its effects were great reduction of strength and loss of flesh, with gradual relief of all the boy's sufferings. The medicine operated profusely by the kidneys. It was continued twice, and at length once only, a day, for another fortnight, when every symptom of the disease had disappeared. The boy was extremely emaciated; but beginning at that time to take an ounce and half of Griffith's mixture thrice a day, he soon regained his flesh and strength, and got quite well. And he remained so eight years afterwards.

Bandaging the head is one of the mechanical expedients which have been tried, and found useful. The only cases to which it can be applicable are those

with sutures yet unclosed. It seems to have been suggested by the notion that the increase of the fluid within, and probably some of the symptoms also, might depend, in part at least, upon the want of firmness and proper resistance in the outer containing parts, the feeble and flexible half-solid skull. A certain degree of support and pressure appears necessary to the due exercise of the cerebral functions. Beyond this degree all pressure is hurtful. In fact, the easy yielding of the bony walls of the head, by reason of the membranous spaces that exist in the early periods of life, proves the safety of these patients. If the skull did not expand as the water gathered, morbid symptoms would ensue. Hence, great nicety is required in the application of this remedy. When the head is palpably enlarging, compression by means of plasters or bandages would probably be mischievous. When the disease is stationary, and the unconnected bones of the skull are loose and fluctuating, and the child is pale and languid, much benefit may be expected from moderate and well-regulated support. Sir Gilbert Blane, it is believed, was the first to suggest this mode of treatment, but its safety and efficacy have been more recently demonstrated by Mr. Barnard of Wolcot, who has related instances in which bandaging was performed with complete success. In these cases the children were pale, bloated, and feeble, with flabby muscles; the bones of their heads were movable and floating, and the functions of the brain more or less impaired. Mr. Barnard applies strips of adhesive plaster, about three quarters of an inch wide, completely round the head from before backwards; covering the forehead from the eyebrows to the hair of the head, as low down on the sides as the ears will permit, and lapping over each other behind;—then cross strips are carried from one side to the other over the crown of the head: and lastly, one long strip reaching from the forehead within half an inch of the root of the nose, over the vertex to the nape of the neck. In his first trial of this plan, but never afterwards, Mr. Barnard laid pieces of linen wetted with cold water over the plasters. Castor oil, to regulate the bowels, was the only medicine given. The effects, in all his cases, were a gradual diminution of the size of the head, mitigation and ultimate disappearance of all head-symptoms, such as strabismus, rolling of the eyes, starting of the muscles, convulsions, and at the same time increased tone of the muscular system, an improved appearance of the skin, and of the secretions from the bowels. These are striking results: they seem to show, that in certain conditions of chronic hydrocephalus, a part of the danger consists in the lack of due support and confinement of the brain; and they prove that compression alone may be equal to the cure.

But it is well known (as has been observed before) that in children who are not of this pale and feeble habit, and in whom ossification of the skull goes on, the period of danger is the period when the walls cease to yield, and the water continuing to accumulate, inordinate pressure arises. To such heads the application of bandages or plasters must of itself be insufficient and unsafe. The brain-case being no longer capable of expansion, there remains to be attempted a diminution of the liquid it contains.

Now, much diminution of the accumulated fluid, through the agency of absorption alone, is scarcely to be looked for; even although we endeavour to aid that process by applying leeches and cold water to the head, and by purgatives, diuretics, or diaphoretics. Some more sure and effectual mode of emptying the distended cavity has therefore been earnestly sought for; and there is one very certain method by which it may be emptied, viz. by perforating with a trochar the membrane of the fontanelle, and the membranes of the brain, and even the expanded cerebral matter itself. He was, indeed, a bold physician who first proposed thus to decant the water from the brain. But his boldness has been amply vindicated. It is not a very new suggestion, nor a new practice; but it has received particular attention in this country of late years: and though tapping the brain in chronic hydrocephalus is denounced as useless and cruel by some high continental authorities, by Gölis and Richter

especially, it offers one of the best among the few chances of safety to the patient; of ultimate safety, namely, for the operation is of course attended with the present risk of accelerating the child's death. Other measures, however, failing, we are warranted in recommending that risk. We must consider that, by performing the operation, we incur the hazard of abbreviating the existence of a being whose life could scarcely have been long continued, or capable of enjoyment: but then we afford some chance of a perfect cure. A speedy death, an uncertain life with *bodily* and *mental* imbecility, or complete restoration, are the three events to be contemplated. Of the three, the second is incomparably the most wretched; and probably few parents, having to decide the painful question in reference to their own child, would hesitate to accept the alternative of probably speedy death, on the one hand; possible complete recovery, on the other.

But, to say the truth, the immediate danger is not so very great as might have been supposed; provided that the operation be cautiously and skilfully performed, and only a moderate quantity of water be drawn off at a time. That even a very rough operation is not necessarily fatal, we learn from a singular case related by Mr. Greatwood. A child, fifteen months old, and afflicted with chronic hydrocephalus, fell down, and struck the back par of its head against a nail, which penetrated the skull. Above three pints of water gradually flowed out at the puncture thus made, and the child was cured.

There is an account of the performance of this operation by Lecat, in the *Philosophical Transactions* for the year 1751. In 1778, Dr. Remmett of Plymouth punctured the head of a hydrocephalic child, on five several occasions, with a lancet, and took away, in all, no less than eighty ounces of fluid. The child died seventeen days after the last tapping. (*Med. Com.*, vol. vi.) A very interesting case of the same kind is related by Dr. Vose of Liverpool. (*Med. Chir. Trans.*, vol. ix.) His patient was an infant seven months old. Its head was more than twice the ordinary size. Three operations were performed, the first with a couching needle. Upwards of three ounces were evacuated, and it was estimated that about the same quantity dribbled away afterwards. Thereupon the child became very weak, but was presently revived by some cordial medicine. About six weeks afterwards, the liquid having collected again, an opening was made with a bistoury, and eight ounces were removed; and nine days after that, twelve ounces more, without any bad consequences. The head diminished in size, the patient got apparently well, and the case was published as a successful one. Unfortunately, however, the complaint afterwards returned, and the child died of it.

Mr. Lizars of Edinburgh operated upon a little patient of his twenty times in the course of three months, using a small trocar. He observed, that upon letting out the water, squinting and dilatation of the pupil, which had previously existed, ceased *immediately*. The child recovered. (*Edin. Med. and Surg. Journ.*, April, 1821.)

Another striking and instructive instance is recorded by Mr. Russel of Edinburgh. The patient was an infant three months old, with an enormous head (twenty-three inches in circumference and fifteen and a half inches from one ear to the other). The child was affected with strabismus, and a perpetual rolling of the eyes. The usual routine measures, compression among others, had been employed without any success. By four operations performed at intervals of about ten days, the size of the head was considerably diminished: but the fluid continuing to collect, calomel was given in frequent small doses, and the gums became sore, and the child got well. At eight months old the dimensions of the head were less (by four inches in circumference, and by two and a half inches across the vertex) than they had been previously to the first tapping; and the sutures had entirely closed. (*Edin. Med. and Surg. Journ.*, July, 1832.) Dr. Conquest has, more than any other person, given authority to this operation. In a paper published in March 1838, he tells us that he had then tapped the heads of nineteen children for this complaint, and in ten of the

nineteen cases the children survived. He introduces a small trocar through the coronal suture below the anterior fontanelle, and cautiously makes pressure upon the head afterwards by means of strips of adhesive plaster, and he closes the wound of the integuments carefully after each time of puncturing. The greatest quantity of liquid withdrawn by him at any one time has been twenty ounces and a half, and the greatest number of operations on any one child has been five, performed at intervals varying from two to six weeks. The largest total quantity of water removed was fifty-seven or fifty-eight ounces, by five successive operations.

This expedient then, though doubtless hazardous, is really a most valuable one. The rules for its performance may be stated in a few words. The operation should scarcely be attempted until other means have failed. The trocar should be small, and it should be introduced perpendicularly to the surface, at the edge of the anterior fontanelle, so as to be as much as possible out of the way of the longitudinal sinus, and of the great veins that empty themselves therein. The fluid should be allowed to issue slowly, and a part only of it should be evacuated at once. The canula should be withdrawn, and the aperture in the skull closed, as soon as the pulse becomes weak, or the dilated pupil contracts, or the expression of the child's face manifestly alters. Gentle compression should be carefully made to compensate, in part at least, the pressure that has been removed with the fluid. Should the infant become pale and faint, it must be placed in the horizontal posture, and a few drops of sal volatile, or of brandy mixed with water, should be given. Sometimes a slight degree of inflammatory action comes on in the course of a day or two after the tapping. When this happens, the remedies of inflammation, and especially leeches and cold applications to the head, must be adopted without delay.

We have twice witnessed this operation. On the first occasion it was performed at our request by a surgeon, upon the infant of a poor woman, after the other measures before spoken of had been tried in vain. To the horror of all who looked on, when the trocar was withdrawn from the canula, instead of transparent serosity, a fine stream of purple blood spouted forth. The opening was at a considerable distance from the longitudinal sinus; but the instrument was not so delicate as it might have been, and one of the larger superficial veins had probably been pierced. Neither was the trocar introduced in a sufficiently perpendicular direction. The chance of striking a vein is obviously increased, and a larger portion of the cerebral mass is also wounded, when the instrument is carried obliquely inwards. The child presently became deadly pale and faint, and its immediate dissolution was naturally expected. Under the use of stimulants, however, it revived again; no hæmorrhage took place internally; and after a day or two it was evidently much the better for the loss of blood. But this amendment did not last: and the mother, who had been terrified at the direct result of the operation, feared to present her infant again, lest it should be repeated. At length the child died, but no opportunity of examining the interior of the head was allowed.

The other instance was that of an infant about eight months old. Four months after its birth, its head was observed to grow inordinately large. At the time of the operation the fontanelles were exceedingly tense; the child screamed frequently, occasionally vomited, and was slightly convulsed; the features were pinched, and the eyeballs distorted downwards, without any dilatation of the pupils. Four ounces of clear liquid were evacuated through the anterior fontanelle. A few hours afterwards, the distortion of the eyeballs had disappeared; the child was tranquil, and much improved in aspect. Three ounces more were taken away the next day. For two days subsequently, the symptoms appeared to be all mitigated; but the skull was flaccid, yielding to the gentlest pressure. On the evening of the fourth day after the first tapping, the respiration became hurried, the child grew dull, and before midnight expired. In this case it appeared to us, that the chance of success was baulked by the want of external support subsequently to the tapping.

Any comparison between the merits of compression and of paracentesis, as substantive remedies, seems idle. They are adapted to different and even opposite conditions of the brain. The one supplies defect of pressure, the other relieves its excess. It is clear that to hold the balance even, requires great care, an accurate judgment, and incessant vigilance. Either expedient may suffice, alone. Both may be (and have been) profitably employed in the same case, according to its varying circumstances. If the head be tense and firm, the trocar should precede the bandage; if lax and moveable, compression should be cautiously made, and followed, if necessary, by the puncture.

THORACIC DROPSY.

Symptomatic of disease of the heart or great vessels. — Rare as a substantial disease. — Physical signs and treatment. — Hydropericardium. — Symptoms and treatment.

DESCENDING from the head to the thorax, we have not much to say respecting local dropsies of that region of the body. Hydrothorax, or water in the chest, was a great bugbear to physicians before the time of Laennec. The symptoms which were then believed to indicate that kind of dropsy—dyspnœa, increased by the recumbent position, paleness or livor of the face, sudden startings from sleep in alarm and with palpitation, œdema of the legs, and scanty urine;—these symptoms, significant as they are of danger, are now known to denote disease of the heart and great bloodvessels, rather than a passive accumulation of water in the pleura. Auscultation teaches us that in many cases where such symptoms present themselves, the lung fills up the space which is natural to it in the thoracic cavity. The liquid found in the pleura after death is often poured forth, there is reason to believe, during the last days or hours of sinking life. Certainly hydrothorax, independent of inflammation, is rare as a substantial disease. The signs that truly reveal the presence of liquid in the pleural cavities, are purely auscultatory. When the quantity of liquid is moderate, the lowermost part of the cavity is dull to percussion; the place of the dulness varying as the posture of the patient is changed. Wherever this dulness exists, the natural murmur of respiration is proportionally faint or extinct: and if the patient be in the erect position, his voice, as it reaches the ear of an observer applied near the scapula, assumes that peculiarity of tone and character, to which the term ægophony has been given.

Liquid may collect to this moderate amount in both of the pleuræ at the same time.

When the pleural sac is full and distended, the physical signs that it is so are very remarkable. Because that side of the thorax is permanently expanded, it partakes but little, or not at all, in the visible movements of breathing; the ribs are separated as after a deep inspiration; the intercostal depressions effaced; the sound produced by percussion is everywhere dull; the mediastinum and the heart are pressed towards the opposite side; no vesicular respiration can be heard; the vibratory thrill, conveyed in most cases to the hand in contact with a healthy chest, while the person is speaking, is now lost; the patient lies, with few exceptions, and for obvious reasons, on the distended side.

This condition cannot exist on both sides of the thorax at once, for it implies the complete suspension of the functions of the lung. It is never reached in simple hydrothorax. It is not an uncommon consequence of inflammatory effusion, or of hæmorrhage into the cavity.

When hydrothorax constitutes a part of general dropsy, its treatment merges in that of the whole malady. If the water can be removed from other parts of the body, it will commonly diminish in the chest also. Seldom, perhaps never,

can we be justified in proposing paracentesis thoracis for the relief of *idiopathic* hydrothorax. There are cases of disease in which that operation proves the salvation of the patient, but they depend chiefly on inflammation, and do not belong to our subject. The writer may refer to a clinical lecture printed in the *Medical Gazette*, vol. xxi. for a condensed statement of his thoughts respecting the operation in such cases.

Hydro-pericardium, as a species of local dropsy, independent of inflammation, is also rare. Like hydrothorax, however, but less frequently, it may form a component part of general dropsy. When present, it is not easy of recognition. The most certain sign (which requires indeed for its appreciation some space of time and repeated observation) is a varying in the extent of surface over which percussion of the pericardial region produces a dull sound. When with this phenomenon there are conjoined the more equivocal symptoms that belong generally to disease of the heart, shortness of breath, blueness of the cheeks and lips, a feeble and irregular pulse; and when especially the patient dares not lie down from a dread of suffocation, but remains fixed in one, usually the sitting position, with his head bending forwards; — we have reason to believe that the bag of the pericardium is distended by several ounces at least of water. In this case, also, the remedy of the hydropericardium is to be sought in the remedies of the general dropsy. If any thing special be indicated, it is the application of a large blister to the præcordia. The project of tapping the pericardium has been broached, nay, the operation has actually been performed; but it is difficult to conceive a case in which so desperate a measure would be justifiable.

ABDOMINAL DROPSY.

Restriction of the term ascites. — Mode of distinguishing ascites from ovarian and other forms of encysted abdominal dropsy.— Exciting causes.— Treatment.

Dropsy of the peritoneum is frequently an incident only of general dropsy. In many instances, however, it is local, and uncombined with any morbid collection of liquid elsewhere. To this species of dropsy the term *ascites* should be restricted. In either case the distension of the great serous membrane of the abdomen is apt to become extreme.

In women there occurs a form of dropsy belonging also to the abdomen, but not constituting ascites, which results from disease in one or both of the ovaries. The points of similitude, comparison, and contrast, between this kind of encysted dropsy and true ascites are so important, and so continually arising in practice, that, foregoing strict system for the sake of utility, we propose to consider the two disorders together.

Ascites, then, signifies the accumulation of serous liquid in the bag of the peritoneum. *Ovarian dropsy* consists in the collection of fluid in one (or more) of the Gräafian vesicles of the ovary, or in a serous cyst connected with the uterine appendages. It is always desirable, though to an inexperienced practitioner not always easy, to discriminate between these different diseases.

One source of distinction between them is furnished by the condition of the abdomen during their early stages.

In ascites the progressive enlargement of the abdomen is uniform, as respects the two sides of the body. The patient being supine, the weight of the augmenting fluid causes the sides of the abdomen, the flanks, to bulge outwards, or swag over. This increased breadth of the trunk of the body is not observable in the case of an ovarian tumour. This circumstance forms also one of the distinctions (sometimes of great consequence to ascertain) between pregnancy and ascites.

When we can trace the early history of ovarian dropsy, we find in most instances that the abdominal tumour was first perceptible on one side, in one or

the other of the iliac fossæ, or somewhere between the ribs and the ileum. But when the distension of the abdomen is great, the distinction between ascites and ovarian dropsy, drawn from the shape of the swelling, often ceases.

Examination of the abdomen, by pressure, will sometimes suffice to inform us that liquid is contained in the peritoneum. If sudden pressure be made with the points of the fingers, in a direction perpendicular to the surface, a sensation is often perceived by the examiner, which it is difficult to describe in words, yet which is quite decisive, and not to be mistaken; a sensation of the displacement of fluid, and of the impinging of the fingers upon some solid substance beneath. By this manœuvre may frequently be detected, not merely the presence of the liquid, but an enlarged liver or spleen, an ovarian or other tumour, even when simple palpation, in the ordinary way, will not allow us to ascertain or trace the outline of these enlargements.

Sometimes, again, we satisfy ourselves, by handling the abdomen, that there is a definite tumour in the situation of the ovary, the liver, or the spleen.

Percussion of the abdomen is fertile of information in these cases.

First, by the sense of fluctuation which it causes, when liquid is collected within.

In copious ascites, if the left hand be laid flat against one side of the tumid abdomen, and a slight blow be struck with the fingers of the right upon the opposite side, the impulse is conveyed by a wave of the liquid to the open flat hand, which feels a little shock that is perfectly distinctive. The larger the amount of accumulated liquid, and the thinner and tighter the walls within which it is confined, the more sensible and decided is this fluctuation.

When the peritoneum contains but a small quantity of liquid, fluctuation may often be satisfactorily made out, by percussing with one finger the most depending part of the cavity, while pressure is made with another finger very near the part struck. By a similar test the presence of fluid in a small cyst may sometimes be ascertained.

An ovarian cyst may be so large as to fill up and distend the peritoneum; and in such a case the sense of fluctuation is sometimes as delicate and perfect as ever it is known to be in ascites.

Mere fluctuation, therefore, is not a discriminating symptom between ascites and ovarian dropsy.

But secondly, percussion is full of instruction in the *sounds* it elicits. The sense of hearing will generally supply what the tact, or the sense of touch, is not always equal to.

In true ascites the relative place of the liquid and of the intestines is determined by the posture of the patient. The bowels, which always contain some gas, float to the upper part of the liquid, and there give out, when the finger, as a pleximeter, is applied to the corresponding surface and struck, their peculiar resonance. Mediate percussion will thus follow the gravitating liquid, and discover always a dull sound in the lowermost, and a hollow sound in the uppermost part of the abdomen.

But it is not so in ovarian dropsy. The cyst, in a diseased and enlarging ovary, rises in front of the intestines, and presses them back towards the spine. Hence, if there be any resonance produced by percussion, it is in one or the other, or in both of the flanks; and the umbilical region yields a dull sound, whatever the position of the patient may be. The same is true of the enlarging womb in pregnancy.

This mode of distinguishing between large ovarian dropsy and extensive ascites is practically of great value; and its usefulness is but slightly affected by its being liable to occasional, but rare, sources of fallacy.

1. The distension in true ascites may be so great, that the mesentery shall not be broad enough to allow the buoyant intestines to reach the surface when the patient is supine. This impediment to the efficacy of the proposed test the writer has met with in practice. A woman came under his care in the Middlesex Hospital with ascites. Fluctuation of the belly was unequivocal. While

she lay on her back, the umbilical and epigastric regions were resonant when percussed, the flanks were dull: when she turned upon either side, the other side, previously dull, gave the hollow sound; the umbilical and epigastric regions, previously resonant, gave the dull flat sound. Under the treatment employed, the accumulated liquid was removed, and the patient left the hospital.

Some time afterwards, in going through the wards, the writer recognised her among the patients recently admitted by his colleague Dr. Hawkins. The ascites had returned, and the abdomen was enormously enlarged, and projected upwards, as she lay on her back, to an excessive height. The writer found fluctuation to be very distinct as before; but every part of the belly yielded a dull sound when struck by the fingers. At length this patient died, and it was seen after death, that there was nothing to prevent the rising of the intestines: they had floated, at the utmost tether of the mesentery, as high as they could, without reaching the surface of the prominent belly.

2. Another occasional source of fallacy has just been hinted at. The intestines may be tied down, and so prevented from ascending, by their specific lightness, to the upper part of the surrounding liquid; and this may happen, either in consequence of the adhesion of the various coils and hanks of the intestines to each other and to the parts behind them, which is not an uncommon occurrence; or they may, though unadherent, be swathed, as it were, and bandaged down, by a thickened and diseased omentum. This also the writer has known to take place. A man died under his observation, having had manifest ascites; yet his whole abdomen, though not so much distended as to hinder the intestines, had they been free to rise, from reaching its walls, sounded dull on percussion. Inspection of the body explained this circumstance. When the peritoneum was opened, by an incision carried through the fore part of the abdomen, a quantity of serous liquid flowed out. The floor of the cavity it had occupied was smooth and level; and was found, on further examination, to be formed by a thick cake of omentum, strapped tightly over the subjacent intestines. Of course the same diseased condition may occur in the female.

3. On the other hand, we have once known an ovarian cyst to exist where the umbilical region was tympanitic under percussion. The case furnished just that kind of exception which serves to prove a rule. A woman became our patient in the hospital, whose history was that of ovarian dropsy. Some time previously she had discovered a small tumour in one of the iliac regions. It increased, without much disturbance of her general health, until it became very inconvenient from its bulk. She was then tapped, in one of the Borough Hospitals, and she stated distinctly that it was not a clear watery fluid that was evacuated, but a glutinous, mixed, and grumous matter, such as belongs to ovarian disease. No doubt could be entertained that the enlargement of the abdomen resulted from disease of that kind, yet the umbilical region, when percussed, always rendered a hollow sound. Upon the death of the patient the mystery was solved. Air hissed out from the opening made by the scalpel through the abdominal parietes; and the source of it being traced, an ovarian cyst, of considerable magnitude, was found adhering to the peritoneum in front of the belly, and containing no liquid, but some yellowish shreds only, the remains, apparently, of some smaller included cysts. This ovarian bag had been filled with air, and had given occasion to the equivocal sounds.

These sources of possible mistake or obscurity very seldom exist; and the physical diagnosis, as it has now been pointed out, is very certain and valuable. So completely physical are the tests, that they are as sure and instructive when applied to the dead, as to the living body.

Other points of distinction may frequently be derived from the history and progress of the two disorders.

The equable enlargement of the abdomen, on both sides, in ascites, and its unequal prominence on one side, in ovarian disease, have already been remarked upon.

Again, it is observable that, in true ascites, there are almost always manifest

indications of constitutional suffering and disturbance, — a sallow complexion, debility, emaciation. The morbid accumulation results (as will presently appear) from disease in some organ, of which the functions cannot be deranged without injury to the whole system.

On the other hand ovarian dropsy may last long, and be extreme in degree, while the general health is scarcely affected. The mere bulk and weight of the swelling cause much discomfort and inconvenience, but in other respects the patient often remains in good health. This appears to be owing to the fact that the ovary is not directly necessary to the life or well-being of the individual, but is merely subservient, for a limited time, to the purpose of reproduction. Among the symptoms that are common to ascites and ovarian dropsy, in their advanced stages, are those which are produced by weight and pressure: such as shortness of breath, from the resistance opposed to the descent of the diaphragm; anasarca of the legs and thighs, from pressure upon the inferior cava and its branches; a peculiarity of gait, like that of a woman large with child, and depending upon the same cause, the necessity of throwing the head and shoulders backwards to balance the weight of the distended abdomen in front.

It is not superfluous to caution the young practitioner against mistaking a distended bladder for dropsy of the abdomen. An old Frenchman, brought into the Middlesex Hospital, was said by his friends to be afflicted with dropsy, and to have been treated for that complaint. The abdomen was large, and dull under percussion, from the pubes to above the umbilicus. In the hypogastric region an obscure sense of fluctuation was detected. There was however a strong smell of urine about the patient. Being interrogated, he said that he had formerly had some stoppage, but that he now passed plenty of water, and that it even ran from him. It was obvious that his bladder was enormously distended, unable to contract upon its contents, and overflowing. With some difficulty a catheter was introduced, and a large quantity of turbid and offensive urine was drawn off. The patient sank at length, and the bladder was found to be much diseased. The writer has known similar mistakes occur in private practice; nay, we learn, on the authority of Sir E. Home, the warning and instructive fact, that John Hunter once actually tapped such a bladder, in the belief that the disorder was ascites.

But encysted dropsy in the abdomen is not always ovarian dropsy.

Omental dropsy is described: the omental cavity alone being unfolded and distended with liquid. This the writer never has seen. Cysts containing a considerable quantity of a clear liquid, and connected with the liver, are common. Probably these are, in all cases (they certainly are in many), the effects of the growth of hydatids. Dropsy of the Fallopian tubes, dropsy of the uterus, large serous cysts in the kidney, constitute other forms of abdominal encysted dropsy. Such states must be discovered by their own particular circumstances. None of them are very common.

Ascites is sometimes the product of inflammation of the peritoneum, but the inflammation having ceased, no trace of it is discoverable in the actual condition of the living patient. The absorbing functions of the membrane having however been spoiled, the collected liquid remains. The writer believes that he has witnessed an instance of this. The history of sudden and sharp pain and tenderness in the abdomen, with fever immediately previous to the dropsical swelling, made it probable that it was the consequence of inflammatory effusion. But the fever had entirely subsided, no tenderness remained, and the general health was good. The patient had no other dropsy.

The main exciting cause however of true and uncombined ascites, is some obstruction to the free passage of the blood through the system of the vena portæ, and, as even prior to experience we might suppose, such obstruction arises more often from disease of the liver than from any other cause.

But disease of the liver is of very common occurrence, and oftentimes very obvious, while there is no ascites. Here, therefore, as in the case of cardiac and renal dropsy before, this question arises, with what kinds of disease of the

liver is hepatic ascites most apt to be associated? And here also, as before, we find that there is one special form of liver disease, which, though not the sole, is the grand cause of passive and simple ascites.

It has long been noticed, that mere enlargement of the liver is not the most common accompaniment of hepatic ascites: but rather the small, hard, contracted viscus. Mere increase in the size of the organ may interfere but little with the portal circulation; whereas a shrinking and diminution of its bulk must needs do so. In point of fact that particular condition of the liver, which the French have termed cirrhose, and which is familiar to morbid anatomists in this country as the *hob-nail* liver, is the great source of passive ascites.

The true nature of this remarkable disease of the liver is of modern discovery. The credit of correcting the erroneous opinions which had been entertained respecting it, is due, as the writer believes, to Mr. Kiernan. The change which the organ undergoes has also been clearly explained by Dr Carswell: it results from chronic inflammation, and chronic thickening, miscalled hypertrophy, of Glisson's capsule. Since Mr. Kiernan's admirable exposition of the true anatomy of the liver has been given to the world, few can be ignorant that the cellular tissue, termed the Capsule of Glisson, accompanies and forms a sheath around the portal vein, the hepatic artery, and the biliary ducts in their course through the liver; while the hepatic vein and its branches are lodged in its substance, without any such investing membrane. It follows that a general thickening of this tissue produces a general pressure upon the portal veins, and impedes the return of the venous blood from the intestines. Hence, as in analogous cases, congestion of the capillaries, arrested absorption, mechanical transudation of serous fluid. The pressure affects also the nutrient vessel, the artery of the liver; so that, in the majority of cases, there is atrophy and shrinking of the viscus; and sometimes, but not always, from pressure upon the biliary vessels, there is jaundice also. By degrees the cellular tissue itself undergoes the process of shrinking, and the linear spaces in which it ramifies on the surface of the liver are pulled inwards; the lobules appear to be prominent; and the surface becomes irregular, knobby, and studded with little roundish elevations, like the heads of nails. The constricted lobules are very conspicuous also in the cut surface of the organ.

In the living body the existence of this hepatic disease is, for the most part, a matter of inference only. It is rendered probable by its ascertained frequency in connexion with ascites, and by the absence of any other obvious cause for the dropsy. But sometimes the irregular surface may be felt through the parietes of the abdomen.

The nature of this morbid change affords a reason for the intractable and unpromising character of ascites in general. The obstructed blood seeks, indeed, new channels, but the compensation they afford is rarely sufficient. The superficial veins become obvious, numerous, large, and wander with many inosculations over the surface of the belly. Large veins, significant of the same compensating effort, have been met with also in the adhesions which previous inflammation had left between the peritoneal surface of the liver and the walls of the abdomen.

Among the causes to which the thickening of the capsule of Glisson may be ascribed, habitual intemperance is probably much the most common. But this condition of Glisson's capsule, though the chief, and by far the most frequent, is not the only cause of obstruction to the current of the blood in the portal vessels, and of consequent ascites. In those specific forms of liver-disease, in which tumours are scattered through its substance, one of these tumours may be so situated as to press upon the trunk of the vein: so, obviously, may abdominal tumours of any kind, enlarged mesenteric glands, cancer of the pylorus, cancer of the head of the pancreas, and the like.

Ascites is found to be not unfrequently associated with disease or enlargement of the spleen also; but, in most instances of this kind, the enlargement

of the spleen, and the peritoneal dropsy, are not connected as cause and effect, but are both consequences of portal obstruction.

When, after death preceded by ascites, the cavity of the abdomen is examined, its contents present a bleached and sodden appearance. It has been made a question, whether this be the result of the long-continued immersion of the living tissues in the accumulated water, or of their short maceration after death. The question has no practical importance.

The anatomical characters of ovarian dropsy have been already fully treated of. (See Dropsy of the Ovary.)

Treatment. Of both forms of abdominal dropsy it may be said, that a cure is seldom accomplished; yet ascites has, upon the whole, a more certain progress towards the destruction of life than ovarian disease, while perhaps it is oftener cured.

In passive ascites, where the distension of the peritoneum has crept on without pain, fever, or other marks of acute inflammatory action, our first and best hope of evacuating the collected liquid will rest upon diuretics. Hepatic ascites and renal disease may be sometimes found in conjunction; but according to the writer's observation they seldom are so: and, except that both may probably owe their occasional origin to habits of intemperance, there appears no reason why they should be. Diuretics may therefore be administered without scruple. The drastic purgatives are also to be employed when diuretics fail to act, or to reduce the swelling, and when the disease is not already complicated with diarrhœa. And, inferring with more or less certainty the existence of hepatic disease, sometimes from palpation of the enlarged or altered liver, sometimes from the coincidence of jaundice, but most of all from the result of accumulated experience respecting such cases, it will be proper to give the patient the chance of the remedial influence of mercury. The disease being chronic the introduction of that drug should be gradual. An eligible form of medicine for that purpose is furnished in Dr. Baillie's mercurial diuretic pill (see p. 135.). The iodide of potassium is thought by some physicians to be especially serviceable in such cases. It may be given, in solution, in doses gradually increased from five grains to a scruple, three or four times a day; or compounds of mercury and iodine may be applied, by the method of inunction, to the surface of the abdomen, and to the hepatic region in particular.

In Germany the muriate of ammonia is in much repute as a therapeutic agent. This salt, though seldom administered internally in this country, is believed by some practical men who have employed it, to exercise all the beneficial influence upon the functions of the liver which is commonly attributed to preparations of mercury, while it is less frequently productive of distress or inconvenience. The experience of the writer upon this point has been too limited to warrant his expressing any confident opinion; but in some recent instances he has certainly noticed a remarkable improvement in the condition of the biliary excretion, after the daily exhibition of a combination of cathartic extract, sal ammoniac, and the extract of taraxacum.

But our efforts to remove by medicine the accumulated liquid, or to cure the morbid condition on which the accumulation depends, are too often made in vain. The distension of the peritoneum continues to augment; the distress arising therefrom becomes urgent and extreme; and at length, to afford temporary ease to the patient, and in the faint hope also of giving him permanent relief, we resort to the mechanical expedient of paracentesis.

In ascites, equally as in ovarian dropsy, it is inexpedient to resort to paracentesis, until it seems absolutely indispensable. To this rule there are in our opinion very few exceptions.

The operation itself, though commonly esteemed a trivial one, is not without its dangers. The instances are not few in which it has been followed by fatal peritonitis; excited either by the mere passage of the lancet or trocar through a previously unhealthy membrane, or (in the case of ovarian dropsy)

by the escape of some portion of the contents of the cyst into the cavity of the abdomen.

Formerly the rapid evacuation of a large quantity of liquid from the belly was often attended by terrifying effects; fainting, convulsions, almost instant death. This made the ancient physicians afraid of the operation; and when they could no longer avoid it, they let the accumulated fluid out by little and little at short intervals.

The cause of these alarming symptoms is now well understood, and easily obviated. They were owing, doubtless, to the sudden removal of the pressure to which the viscera and large bloodvessels had for some time been submitted and accustomed. For this explanation of the fact we are indebted to the sagacity of our celebrated countryman Dr. Mead, who was the first to suggest that external compression should be substituted, in lieu of the tension taken off by the operation. The complete success of that expedient fully justified his ingenious opinion. We now drain the cavity of its liquid contents without scruple or delay. A sheet or broad roller is thrown round the patient's body, and tightened as the fluid escapes, so as to maintain an equable pressure, which is continued for a while, and at length gradually withdrawn.

Other casualties occasionally happen. The trocar has sometimes pierced the intestine. In one instance, witnessed by the writer, clear serum issued for some time through the canula; but at length pure blood, not less than a pint. The patient sank, and no opportunity was given to investigate the cause of the bleeding. In another strange but well authenticated case the almost incredible quantity, twenty six pints, of blood flowed out at the orifice made by the trocar, and afterwards separated into clot and serum. To the wonder of those who saw the incident this patient recovered from the tapping, and the source of the hæmorrhage is still a matter of conjecture.

And apart from these mischances, which arise indeed in but a limited number of instances, it must be remembered that paracentesis can seldom be contemplated as a mode of cure, but simply of temporary relief from distress. A few instances have happened where the liquid has been drawn off, and has not again collected; but such cases are very few. So also, according to the experience of the writer, are those, much talked of by authors, in which the kidneys resume their activity upon the removal of the dropsical fluid.

Ordinarily, the liquid re-accumulates, often with more rapidity than before; and again, and again, the hazards and the inconvenience of the operation must be repeated. Wherefore, in the writer's judgment, paracentesis in abdominal dropsy ought not to be performed, unless the quantity of liquid is so great as to occasion painful distension, or cause great distress of breathing by its upward pressure against the diaphragm,—or give rise to some positive suffering or urgent inconvenience, which the evacuation of the water may be expected to remedy.

These remarks apply with the greatest force to the first operation; its repetition may be allowed with somewhat less reluctance. There is always some danger, when on subsequent occasions it is too long deferred, lest the diminished strength of the patient fail altogether under the exhaustion produced by the renewed drain from so large a surface.

It is seldom that tapping is many times performed upon the same person, when the complaint is mere passive ascites. The dropsy returns indeed—and again the operation is required. Meanwhile, in most cases, the health and strength rapidly deteriorate, and the patient sinks.

Acupuncture of the dropsical abdomen has of late been recommended; and cures, thus effected, have been announced. It is said, or supposed, that the inclosed liquid, oozing gradually into the cellular tissue of the integuments of the abdomen, is thence gradually removed by absorption. Of this method of treatment the writer has no practical knowledge.

SCROFULA.

Definition.—Description of the scrofulous constitution.— Of the progressive stages of scrofula.— Of the scrofulous ulcer.— Tuberculous deposit in tissues and organs.—Nature of tubercle.— Origin.— Composition.—Modification of other diseases by scrofula.— Complications.— Statistics.— Causes.—Prevention.— Treatment.

THE term Scrofula, or, as it is sometimes written, Scrophula, is derived from the Latin word *scrofa*, and was originally used by Vegetius* to designate a disease in cattle not unlike the scrofulous glandular swellings which occur in the human subject. The Latin authors first adopted it as a nosological term, using it to indicate swellings which are understood in the present day to be scrofulous. It may be regarded as amongst the severer inflictions of our temperate latitudes, not only from the frequency of its occurrence, but likewise from its being generally intractable and opprobrious in its nature, and, when affecting organs of importance, most fatal in its consequences. Cullen defines scrofula to be "tumours of the conglobate glands, chiefly in the neck; upper lip and soft part of the nose tumid; face florid; skin soft; abdomen large." Authors now, however, appear to agree that scrofula consists in the presence of a morbid deposit, to which the name tuberculous matter has been given; so that the so-called scrofulous swellings of the neck, consumption, tabes mesenterica, certain enlargements of the joints, eruptions of a peculiar kind, many cutaneous ulcers, &c. are in fact scrofula, and owe their distinguishiug characteristics to one and the same cause, constituting varieties of the same affection, manifesting itself in the different organs, whether these be the glands, lungs, mesentery, bones, articulations, skin, &c.

From so many different textures being liable to the influence of scrofula, from its sparing in its ravages neither age, sex, nor condition, and from its assuming many and very different appearances, it becomes a matter of the highest importance to acquire an intimate knowledge of its causes, nature, and symptoms. Notwithstanding the opportunities of daily observation, and the number of facts collected, the history of this disease is yet fraught with much doubt and uncertainty. As far as the morbid structure and the symptoms attendant are concerned, very considerable progress has been attained, but little has been done in the study of the remote causes, or towards ascertaining the intimate nature of what has been termed the scrofulous constitution. This may be somewhat accounted for by attention having been chiefly directed to that period in which scrofula is fully established, while investigation into that previous condition, which is the forerunner of this more obvious state, has been comparatively speaking neglected. This is the more remarkable, as from the time of Gordonius †, in the twelfth century, writers on scrofula have particularly dwelt upon the fact of there being a temperament or diathesis proper to it. They state its more usual characteristics to consist in an extreme whiteness and exquisite fineness of the skin, in fair hair and blue eyes, in a soft and rounded form of the body, which is rather pleasing than otherwise, and which is owing to a full development of the cellular tissue effacing all lines and muscular projections; that frequently this constitution presents the aspect of a florid habit and full robust health; the integuments to the eye appear firm and elastic, although to the touch they are soft and flabby; the countenance, for the most part full and rounded, presents an expression of softness; the cheeks, tinted of a bright rosy hue, form a pleasing if not brilliant contrast with the whiteness of the skin; the teeth, which are pearly white, have a tend-

* Plerumque strumæ, vel parotides, aut scrofulæ jumentorum guttur infestant. (*De Re Veterinaria*, lib. ii. cap. 23. B.C. 385.

† Hippocrates, Galen, Celsus, and the earlier writers generally, though they describe this disease, do not appear to have noticed any such distinguishing constitution.

ency to early decay; the lips are very apt to be swollen, especially the upper, which is likewise often chapped in the centre; sometimes the columna nasi and lower parts of the nostril are tumefied; the skin is easily irritated, and wounds made in it are difficult to heal; obstinate eruptions are excited by slight causes, as the stings of insects, or the ordinary epispastic applications; and cases are even mentioned where, in scrofulous children, scented soaps have been sufficient to cause the immediate appearance of a papular eruption. (*Cyc. Prac. Med.* art. SCROFULA.) There also often exists a tendency to excessive perspirations, which are sour and fetid to the smell.

The moral and mental faculties are usually of a pleasant cast, though often accompanied by irritability and impatience. The intellect in early age is full of activity, vivacity, and cheerfulness; nothing is more striking than the ready appreciation of thought and feeling in children of this constitution: it is, however, deficient in firmness and solidity, and is too vacillating in its character for great enterprises. As age advances, imagination evidently predominates over judgment.

Such is the constitution most ordinarily described as the scrofulous; it in many respects answers to the sanguineous temperament of old authors. Many however state, that the atrabilious or melancholic is likewise characteristic of this diathesis: "Beaucoup d'entre eux sont châtains ou bruns, ont la peau sêche et peu d'embonpoint." (*Baudelocque.*) This crasis is distinguished by the dark complexion, the countenance swollen and pasty, the habit indolent, the functions of the body performed sluggishly and even imperfectly, the nervous energy feeble, feelings obtuse, and both the moral and intellectual powers occupying a low rank. According to Dr. Thomson, the worst forms of scrofula occur in those of this temperament, and there can be no doubt that he is correct. (*Lectures on Inflammation*). Others more exclusively confine the scrofulous constitutions to that crasis which is termed the lymphatic (phlegmatic): indeed there are some who affirm scrofulous affection to be in great measure only an exaggeration of it; express strongly, says Richerand, all the characters attributed to this constitution of the body, and you have a faithful picture of scrofulous affection. (*Nosog. Chir.*) The lymphatic temperament is characterised by a fineness and whiteness of the skin, roundness of form, want of firmness in the chest, muscular feebleness, and apathy of mind; all of which nevertheless present a condition which is perfectly consonant with health. If this constitution be developed in excess, obesity with other inconveniences is the result; but it does not follow that there should necessarily supervene those glandular enlargements, ulcers, chronic inflammations, caries, &c. so common in the scrofulous, and which one would expect to be the case, were the view entertained by Richerand correct. Although it is not to be denied that those of this temperament suffer greatly from scrofula, yet it must not be too hastily assumed that they are the most susceptible; indeed Guersent (*Dict. de Méd.* tom. xix. p. 190.) says, that of the great number he has seen so afflicted, the majority did not answer to the lymphatic temperament, and according to Baudelocque not one half belong to it.

Whatever may be the relative frequency of this disease in different constitutions, it is evident, from what has been now stated, that no particular temperament nor complexion can strictly be called scrofulous. Nevertheless, certain characteristics do exist by which an inherent predisposition to the disease is indicated, and it follows that as scrofula consists essentially in the formation and presence in the various tissues of tuberculous matter, any condition of the system which, under certain exciting causes, is prone to its development, may justly be termed a scrofulous diathesis. This condition we shall now endeavour to describe; before doing so, however, it is necessary to premise that its characters are progressive, and not always the same; that they are generally more pronounced if of hereditary origin, than when acquired in after life only.

The general form is frequently deficient in proportion and symmetry; the head being relatively larger than the trunk; the abdomen prominent, and the

limbs small, with large rounded joints. The skin, usually opaque, becomes sallow in the dark-complexioned, while in the fair it assumes an appearance not unlike blanched wax. To the feel it is soft and flaccid, and presents but little elastic resistance to the touch, giving the impression, when pinched, of being thinner than is usual in persons of a healthy constitution. It is indeed owing to its being really very thin in texture, that the veins are seen ramifying beneath it. It rapidly shrinks away under privation, fatigue, or disease; but the effects of these being recovered from, its previous state of fulness is as quickly restored: this is owing to a deficiency in what has been termed stamina, or enduring tone. When this constitution is more marked, the skin becomes coarse and dingy, generally dry and harsh, excepting in the palm of the hand, which is bedewed by an unhealthy cold moisture, and very subject to various eruptions of a scaly or furfuraceous nature; the hair, especially in the morning, is dry and harsh to the feel, and looks as if undressed; the countenance is doughy; the cheeks are full and rounded; the upper lip and nose swollen; the eye large, with a very open pupil; the eyelashes, unless destroyed by conjunctival inflammation, long and handsome. The tips of the fingers are square and flat, presenting that appearance which is termed clubbed.

The powers of the body are very inadequate to the apparent strength of the mould in which it is cast: fatigue is soon experienced, and the period of renovation is protracted. The circulation is generally feeble, as is indicated by a weak pulse and cold extremities. This state of the circulating system forms an element in the tuberculous constitution (*Clark on Consumption and Scrofula*, p. 15.); it is rarely found wanting, and may be regarded as affording an explanation of many of the phenomena of the disease. The functions of digestion are much enfeebled; the bowels become irregular, for the most part torpid; and the evacuations, especially in infancy, are not healthy; the urine is scanty, turbid, and ammoniacal; the cutaneous secretions are very irregular, sometimes suppressed, at other times excessive; their character is also diseased, being occasionally more or less fetid, and usually leaving a reddish stain on linen if worn many days. The nervous system is characterised by an exaggeration of its natural bias; the irritability or apathy of the constitution, as the case may be, becomes more marked. Protracted and frequent sleep is ordinarily much indulged in, and after slight exertion is profound in the extreme.

In order clearly to understand the history of scrofula it will be necessary to consider it in its different stages; first under its simple or uncomplicated and more usual forms, and afterwards as it occurs in particular organs.

The first or incipient stage is when, as yet, no tubercular deposit has taken place. The consideration of this very important period of the disease has been mainly neglected. In its description will be included many of those symptoms which have hitherto been identified, though most improperly, with the scrofulous diathesis.

The countenance, to the casual observer, presents the appearance of good and excellent health; a more accurate observation, however, betrays this appearance to be illusive, and that, in fact, the cheeks which look so full and rounded are really softer and more flaccid than is proper to robust health. The countenance, after very slight fatigue, is often expressive of mental distress, as well as of bodily fatigue; it has altogether a haggard and worn expression. The cheeks have a hectic flush, increasing by its effect the brightness of an evidently excited eye. As this stage advances, the countenance loses its fallacious appearance, and takes on a hollow and jaded character: should the complexion be sallow, the unhealthy appearance is very marked; it is dull, untransparent, and doughy; and the lips become pale and deficient in colour. The last joint of the fingers becomes swollen and rounded instead of tapering, and the nails have a tendency to assume a square form and bend forwards.

During this incipient period of the disease, nothing is more annoying than the great liability to colds and slight feverishness. The most trivial causes

appear to excite inflammatory action in the mucous membranes, during which all the other symptoms are aggravated. The patient complains of frequent faint perspirations, alternating with a dry feverish state of the skin, which is very irritable, as is shown by the effect of any slight wound. The cold clammy extremities are very liable to chilblains. The mucous membrane of the nose becomes inflamed, and discharges a thin acrid sanguineous matter, which excoriates the external surface; the alæ and septum become swollen. The air, passing through with difficulty, obliges the sufferer to breathe in great measure through the mouth; so that the half-open mouth becomes almost characteristic of the disease. The upper lip participates in the swelling, and now is seen the chap in the middle of it,—a symptom of the disease itself, and not of the diathesis only, as is usually stated to be the case. The inner membrane of the eyelids is often irritable and inflamed; and the eyelashes, generally so long and beautiful in the scrofulously disposed, drop off and leave the eye unprotected; the cause of great weakness and irritability in the eyes themselves. This stage in short presents all those appearances that we might conclude likely to occur in a subacute state of inflammation of the mucous membranes.

On its accession there is, in those of a sanguineous temperament, an exaltation of the mental powers. The perceptions are quickened, the expressions are lively and brilliant; while, in persons of the cold and phlegmatic constitution, there is an increase in dulness of perception, and a more marked tendency to lethargy and inaction. The nervous system participates in the morbid changes, and shows more sensibility than is natural. The temper is often much changed; for the most part it is placid, quiet, and relying, though often, especially so in those of a bilious temperament, desponding and perverse. The sleep is disturbed with dreams, and not unfrequently attended by weakening perspirations of an offensive character. The patient during this stage, though complaining often of illness, scarcely knows how to describe his sensations, feels no one symptom of sufficient importance, but seems generally complaining and unwell.

The next stage of the disease, generally occurring between the second and twelfth year of life, is characterised by indolent swellings of the glands, cellular system, and joints. In milder cases, these occur in the form of small spherical or oval tumours, moveable under the skin; they are generally enlargements of the conglobate and lymphatic glands, an effusion of fluid being often perceptible, which is exterior to the body of the gland, and contained in, and circumscribed by, the adjacent cellular membrane. (Goodlad, *on the Absorbent System*, p. 75.)

The distension which this effusion produces is a source of additional irritation. Very often the cellular system is the exclusive seat of this stage, and in many parts of the body cold indolent swellings arise, which, unless repressed, are apt to pass into obstinate sores, burrowing under the surface, and forming extensive sinuses. These swellings are soft, puffy, and immoveable, and not attended by any discoloration of the skin.

The glandular swellings are soft, with a feeling of elasticity, which frequently continue stationary for some period. Their more usual seat is in the neck, under the ears and chin. The joints of the elbows, fingers, toes, knees, &c. become swollen, and at times stiff; these swellings are not moveable, as elsewhere, consisting rather of a diffused tumefaction, and which, when excessive, very obviously impedes the free action of the joint.

Whether it be the glandular or the cellular tissue, or the joints themselves, that are thus affected, there is every reason to suppose that they undergo all the stages of inflammation, but, as Dr. Thomson properly observes, in each of these stages it exhibits phenomena which are peculiar to the scrofulous constitution. Some have maintained that these swellings have not essentially an increase of temperature, and there can be no doubt that the tumefaction is far greater in proportion than either the degree of heat or the pain; there can however be no doubt that these swellings are accompanied from the first with a sensible degree of heat, slight redness and pain on pressure; occasionally the heat and pain become excessive. The lymphatic glands of the neck are most

frequently affected, probably because they are so generally exposed to cold (Alison, *Edin. Med. Chir. Trans.* vol. i.); frequently only one or two are thus affected, sometimes so many of them, and to so great a size, as to cause the most painful results from pressure both on the air-passages and bloodvessels. It is not a little singular, that while very slight irritations have the effect of originating swellings in the glands, yet that the more severe irritation of teeth-cutting, though fraught with so many other graver maladies, very rarely induces them; these swellings in fact seldom occur until after the period of dentition, or even the second year, when they are easily excited, especially after febrile and eruptive diseases. The glands of the groin and axilla are less frequently affected than those of the neck, and even when this is the case, they are generally not of the true scrofulous character, but rather the result of simple inflammation occasioned by absorption or other irritation. The swellings in the subcutaneous cellular tissue, which are the adventitious glands of Wiseman, are soft and puffy, and manifest but little or no disposition to suppurate. (*Surgery*, vol. i. p. 403.) They often appear very suddenly, and, from the absence of pain and discoloration, may exist a long time without being perceived. They are usually of an oval figure, and seem to be produced by the effusion of a fluid into the interstices of the cellular texture. They are very variable in their size, being one day more prominent and tense, and the next more sunk and flaccid. As this stage progresses, the tumours increase in number as well as in volume.

The third stage consists in the more active state of the disease, as evinced by lancinating pains, febrile excitement, &c. Some portions of the superjacent skin become pale, and one or more small openings spontaneously occur, by which the fluid is poured out. Though this is much like pus at first, it is different from that which proceeds from an ordinary abscess. As the discharge continues, it becomes less thick, until at length little else is exuded than a viscid serum, intermixed with white tuberculous matter resembling the curd of milk, and which offers the true distinctive character of the disease. Mr. Goodlad describes three different modes by which this period of suppuration is arrived at. In the first there is an early effusion of fluid exterior to the gland. The abscess feels soft, like a bladder not entirely filled, and what would otherwise be the most convex part of the swelling appears almost flat. The fluid which is discharged when the abscess bursts, consists of flakes of coagulable lymph, swimming in a half puriform fluid. The pus is formed exteriorly to the gland, so that, when the skin and cellular membrane are absorbed, the cavity of the abscess is very superficial, and the tumour continues almost as prominent as before the discharge of the fluid. In the second, the progress of the ulcer is attended with simple enlargement of the glandular substance, or of the adjacent parts, caused by the effusion of coagulable lymph, through which bloodvessels ramify themselves. In the third species, the abscess is formed in the substance of the gland, and a portion of its parietes must be absorbed before ulcerations can take place. If the cells of the gland are separated by adhesion, each cell may contain an abscess, and successive openings are formed for their discharge.

In the subcutaneous cellular tissue this disease presents itself in the third stage under the form of chronic phlegmon passing into abscess. The progress of these swellings is often very protracted, and accompanied by only a slight increase of heat and a sensation scarcely amounting to pain; the skin is of a dull red; and the form of the swelling, instead of being circular, as in ordinary phlegmon, is oval.

The pus is similar to that which is found in scrofulous glands in character. These subcutaneous abscesses may form on the hairy scalp, neck, chest, belly; in fact, no part is exempted from being occasionally the seat of them. The abscess which forms in a lymphatic absorbent gland often gives rise to the production of a fistulous sore, while that which occurs in the subcutaneous cellular texture most frequently terminates in an open scrofulous ulcer. (Thomson, *op. cit.* p. 159.) The contents of these abscesses sometimes

become chalky. This only happens, however, when the progress of the abscess has been marked by unusual indolence. Occasionally another series of changes marks the progress of a scrofulous gland. The lymph effused into its substance becomes organised into a dense hard tumour, covered by a red shining thin integument, in which, after a certain period, a number of small apertures takes place, thus presenting a honeycomb appearance: from these there exudes a thin serous discharge.

The scrofulous ulcer presents peculiarities which are sufficiently characteristic. Its margins are smooth, obtuse, overlapping, hard and tumefied, and have a purple or rather dull red colour. The surface of the sore is of a light red. The granulations, which rather resemble raw flesh, are flabby, indistinct, and present a glossy appearance. The discharge is thin, slightly ropy, copious, with curdy-like flakes. In this condition it remains for some time, being exceedingly indolent, and if excited to action rather ulcerating than throwing out fresh granulations. It is not usually attended by much pain, is naturally indolent, and very difficult of cure.

Such may be considered the more ordinary forms of what is termed simple scrofula. This disease occurs, however, at times in almost all the organs of the body, and under many modifications. Several of the eruptive diseases have been esteemed essentially scrofulous on account of their being found so frequently accompanying the disease, and because they often yield to the anti-strumous medicines. Amongst these affections the porrigo favosa, porrigo furfurans, and porrigo larvalis, acne indurata, eczema impetiginoides, and eczema rubrum are generally stated to be the chief. There does not, however, appear sufficient ground for arbitrarily deciding that they are so; nor, if we regard them as not having in their constitution any thing of a tuberculous character, does it appear consonant with the definition of scrofula so to include them. They are far better stated as being diseases often associated and complicated with scrofula. Lupus however appears to be a true scrofulous disorder, "commencing by the slow development of a tubercular induration in the tissue of the true skin, or mucous membrane, sometimes perhaps in the subcutaneous or submucous cellular tissue." (*Cyc. Pract. Med.* art. NOLI ME TANGERE.) This indurated tubercle may either be single or grouped. The progress of the tubercle towards the surface is marked by the violet colour of the integuments, which spreads superficially as the tubercle makes its way. The cuticle is eventually broken, and then a scab of a coarse laminar appearance is formed from beneath, whence exudes a thin ichorous foul discharge. On this crust falling off, an ulceration of a most malignant character is exposed. Lupus is occasionally only superficial; at other times it is a deep and erosive disease; in other instances it is attended by a true hypertrophy of the neighbouring parts.

The deposition of tuberculous matter in the subcutaneous system has already been spoken of and shown to be identical with Wiseman's adventitious glands. So much do they resemble glandular swellings, that those not practised in seeing them might easily be deceived; they are composed of cysts having a firm inner lining of coagulated lymph, presenting somewhat of a fibrinous appearance; the interior is filled with tuberculous substance, either in a crude state or as curdy pus Another form of scrofula in the cellular system is that species of abscess named by the French *abcès froids* and *abcès par congestion*: these abscesses, which rise rapidly, are generally found in the interstitial membrane, separating the muscles or under the fasciæ. Their contents are at first serous; then sero-purulent, intermingled with curdy flakes; more rarely they consist of a thin pus. This is usually the nature of the abscesses surrounding scrofulous joints.

Another and very inveterate affection of this tissue is one which manifests itself by the skin assuming a livid colour and becoming hard and stiff. In this state it may remain many months; and though no outward sore is visible, yet there is beneath the surface a most mischievous process going on. This is brought to light by the formation of a small abscess caused by the irritation of

the dead portion of cellular tissue; which is of a yellow colour and firm consistence, and is discharged only on a free opening being made. It is a most obstinate form of disease, and we believe answers to what Rayer terms *scrophule vulgaire vasculeuse.* Another form we have had an opportunity of observing has been that of an ulcerative process going slowly on in the cutis vera immediately below the surface, the surface itself presenting rather a more exsanguineous appearance than is natural. As the disease eats away the understratum, the superficial integument breaks down, presenting an open wound of a fleshy glistening character. In the cases to which we allude, this process goes on to a very great extent. It is a form of disease very difficult to control, and on recovery leaves deep and disfiguring cicatrices.

The mucous membranes are a very frequent seat of scrofulous disease. Dr. Alison in his valuable paper states, that he has observed the tuberculous matter in the free surface of these membranes, and that it is deposited loose in the air-cells. This view of the subject has however been opposed by others; and Gendrin, especially, maintains such to be nothing more than the product of inflammation, and not true tuberculous matter. (*Hist. Anat. des Inflam.* vol. ii. p. 310.) Dr. Carswell, however, takes the view of Dr. Alison, and his very accurate dissections should almost place the question beyond a doubt.

The mucous membrane of the nose in scrofulous subjects has been previously spoken of as frequently liable to a state of irritation and disease; occasionally this takes on an aggravated form. It ordinarily commences with trifling tumefaction and redness about the alæ nasi, attended by a mucous discharge which obstructs the nostril; as the disease advances, the discharge becomes thin, puriform, and so irritating as to cause frequent sneezing. The odour exhaled is so offensive as to be disagreeable to all save to the sufferer himself, the destruction of the membrane preventing his being sensible of it. Should the disease not be controlled, the septum becomes perforated, and the spongy, and even in some cases the nasal, bones are destroyed.

The mucous membranes of the eye and lachrymal passages are very frequently affected. Mr. Lloyd gives a description of what he terms scrofulous ophthalmia; in which he mentions, amongst other symptoms, a thickening of the eyelids. (*On Scrofula*, p. 312.) The frequency of this disease is confirmed by many observers. In Vienna, according to Beer, nine tenths of the cases of ophthalmia in children are of scrofulous character; and at Breslau it is estimated, by Benedict, to bear the yet higher proportion of 95 to 100.

Dr. Cumin says, " The eruption of the minute vesicles (phlyctenulæ) or pustules, which occurs in scrofulous inflammation of the conjunctiva, seems to approximate it to other diseases of the same class, when numerous crops of very small tubercles are seen on the investing membranes of various organs; but it does not appear that true tuberculous matter has ever been detected in any part of the eye."

The mucous membrane of the digestive canal is very liable to be affected by scrofula; occasionally small spots of ulceration, which appear referrible to this cause, are found upon the surface of the pharynx and œsophagus. Dyspepsia has been stated by Dr. Todd to be a prominent symptom of the scrofulous constitution; we are therefore prepared to find the stomach and intestines the frequent seat of the affection. Amongst the lesions which may be esteemed of scrofulous origin in the stomach are softening and thinning of its coats, but more especially a mammillated and greyish appearance of its mucous membrane. (Louis, *on Phthisis.*) Instead of its natural uniform and velvet-like surface, it presents prominences of different forms and dimensions, generally rounded, from one to two lines in diameter, resembling the fleshy granulations of wounds, and occasionally separated by deep fissures of variable length and a line or rather less in breadth. These prominences are almost always of a greyish colour, mingled with a pale red tint. The mucous membrane often passes into a state of ulceration, the sides of which are circumscribed, and not elevated. In the small intestine the softening is not so frequent as in the

stomach, but the granulations of a semicartilaginous and tuberculous nature, as well as ulcerations, are very commonly met with: these last are more frequent than the granulations, whence Louis concludes that they are often unconnected with them. In the submucous cellular tissue of this intestine there are occasionally found minute abscesses, which may be considered as proper to scrofula. The large intestine is subject to much the same lesions as have been observed in the small, with the exception of the semicartilaginous granulations. The tuberculous granulations are situated either in the centre or the circumference of the ulcerations, and not in their intervals. Thickening (and this is an important scrofulous lesion) is often attended by softening and increase of colour, evincing the presence of a very low state of inflammation. Carswell says, this is very frequent, and that it is the consequence of the presence of the tuberculous matter, as is evidenced by the increased vascularity, softening, and ulceration of the follicles and mucous membrane generally of the intestines and bronchi. These ulcerations always occupy the situations in which tuberculous matter is most frequently deposited.

The serous membranes, equally with the mucous, are liable to this deposit; minute tubercles and tuberculous matter in greatest abundance are met with scattered on their surface and imbedded in their tissue. The pleura, the peritoneum, the arachnoid are each the seat of this deposit, and Dr. Bailie mentions the instance of its occurrence in the pericardium. When this disease attacks the membranes of the brain, it causes effusion and all the symptoms of hydrocephalus. This takes place much more commonly in infancy than is usually suspected; children of scrofulous parents being often afflicted and dying from it. Its occurrence in the peritoneum is first made evident by serous fluid being exhaled into the cavity amongst which are floating flakes of tuberculous matter: these increase, while the serum is reabsorbed, leaving the intestines glued together by the curdy deposit.

Perforations in the intestines are sometimes owing to ulcerations originating in the serous coat, and eating their way inwards, though more usually the contrary is the case, the ulceration commencing in the mucous coats and destroying from within outwards.

The synovial membranes are liable to scrofulous disease. Dr. Craigie states that no doubt can be entertained of the frequency of albuminous deposits, and he believes that tubercles have been seen in the coxo-femoral synovial membrane in disease of that joint, though he has not had an opportunity of verifying it. (*Elem. of Gen. and Path. Anat.* p. 810.)

The osseous system is very frequently affected in scrofula. Wiseman indeed says that the bones are scrofulously diseased as often as any other part of the body. In the tuberculous constitution, the bones are more slender throughout, their cortex or outer wall is much thinner, and their interior more soft and vascular, than the bones of persons of sound and vigorous constitution. Unlike syphilis, which generally affects the more hard and compact portions, scrofula attacks the softer and more spongy, as the heads of the cylindrical bones, bones of the carpus and tarsus, and the bodies of the vertebræ. According to most writers, there is first a slight increase of vascularity, the effect of which is an absorption of the earthy matter of the bone, in consequence of which it becomes much softened, so that it may be cut with a knife, as if it were cheese. This condition is often very limited, the surrounding parts appearing quite healthy; at other times the whole bone participates in the injury. As the disease advances, the fluid which is proper to the cancelli becomes thick and caseous, in consequence of which an irritation is set up, a gelatinous fluid is thrown out, and thickening and hardness ensue. In the course of time, vessels carrying red blood ramify through the cartilages, which ulcerate: this process commences in small spots on the surface, which is connected with the bone. Occasionally a portion of caseous bone dies and exfoliates. The effect of these injuries is the effusion of serum and coagulable lymph, whence the puffy swellings so frequently observed; then the formation of abscess, which

makes its way through the synovial membranes, ligaments, &c. discharging itself externally by openings connected with different sinuses. Mr. Lloyd says, that if a scrofulous bone be injected at an early period of the disease, or before the whole of its cancellous structure is altered, the injection very freely enters its vessels; but if it be injected at a more advanced period, there evidently appear to be fewer vessels; though it is very probable that a fine injection may be forced into vessels which previously ceased to carry red blood. (*Op. cit.* p. 123.) Sir B. Brodie believes this observation to be correct, and that in the last stage of this disease the bones not only lose their vascularity which they possessed at an earlier period, but even become less vascular than healthy bone; and that this diminution of the vessels, and consequently of the supply of blood, is probably the cause of those exfoliations which sometimes occur where the disease has existed for a considerable time, especially in the smaller bones. (*Diseases of the Joints*, p. 246.)

This form of scrofula is very insidious in its origin, — even when serious lesion is established there is often so little local uneasiness, as scarcely to call attention to the part, — weakness, and some little occasional tired feeling, being perhaps the only circumstances complained of, and these so lightly as to be attributed rather to a weak state of the general health than to local affection. As the disease becomes established, the symptoms are more marked; a dull, heavy, constant pain is experienced, which, though felt to be deep-seated, is not increased by pressure, nor aggravated by motion, unless the disease be in the hip, knee, or ankle joint. The explanation of this is, that the soft parts, after exertion, do not so well maintain the relative positions of the bones, and therefore pressure ensues. This stage of the disease is often protracted without much alteration taking place in the symptoms; generally, however, as it advances, the pain becomes more decided, and there is, towards night, or after exercise, evident enlargement in the soft parts, which is owing to some little increase in the secretion of the synovial fluid. Eventually the pain becomes excessive, the inflammation very marked, the general health participates in the local injury, hectic fever and night sweats set in, the pulse becomes weak and quick, and a diarrhœa together with the discharge from the extensive abscesses tend to weaken and destroy the constitution.

The spinal column is also a frequent seat of tuberculous deposit. The bodies of the vertebræ are subject to much the same series of changes as already described. When the softening and caries are fully established, the bodies of these bones no longer support the weight above them, but, yielding to the pressure, angular curvatures are produced. Most generally the curve is from within outwards; though at times, when one half of the bone is more affected than the other, lateral angular curvature is produced.

The periosteum is sometimes a seat of scrofulous affection. It is attended by inflammation, abscess, swelling, exfoliation and destruction of the bone it covers, and, according to Dr. Cumin, to absorption of the osseous tissue, which is replaced by dry tuberculous substance without softening of the bone; and that to this form of tuberculous disease are to be referred some of those cases which have been named osteo-steatoma. This morbid deposition, which he has observed lying in contact with the bone in large angular masses, bears a striking resemblance to suet or adipocire, but its nature is truly that of coagulated albumen, for it emits, under a strong heat, the odour of burnt cheese or horn, and produces no greasy stain when rubbed on paper.

The advanced state of medical knowledge in the present day has shown that scrofula is not essentially a disease of the lymphatic system; its vessels, however, are frequently a seat of tuberculous deposit: this is especially the case when the glands are affected, and may generally be observed when those of the mesentery are tuberculous: occasionally they are thus rendered quite impervious. The thoracic duct is even sometimes affected: Mr. Cruickshanks relates a case in which two thirds of it were filled with a caseous matter. This patient had scrofulous affection of other parts at the same time.

The lymphatic glands we have already particularly alluded to. Those most frequently affected are the submaxillary and sublingual. The parotid gland and tonsils are not so frequently, though swelling is very usual in them when the cervical glands are enlarged. Dr. Cumin says, tumefaction of the tonsils is seldom absent, if the strumous constitution be strongly marked; and that it may exist from an early period of life, or even in some instances be congenital. These swollen tumours are very liable to inflammation, to aphthous sores, and ulcerations.

The glands of the mesentery are very frequently scrofulous. At the commencement of this disease, the appearances presented are minute spots either in the centre or circumference of the glands, interspersed through a structure unusually red, and less consistent than natural. The glands so affected are generally found in masses. In the more advanced stage, that condition of system is established which is known under the name of *Tabes Mesenterica.*

The mesocæcal, mesocolic, and lumbar glands are occasionally, though not so frequently as the mesenteric, the seat of the disease. The bronchial glands are very often affected, being increased in volume, of a greyish and black colour, and occasionally, though more rarely than is the case in other glands, tinged with blood.

In the arm-pits and groin the glands are very apt to swell, inflame, and be destroyed by the formation of abscess; generally speaking, however, this is not owing to scrofulous disease, but rather to ordinary inflammation. When the true scrofulous disease occurs in those of the groin, it is usually as a concomitant of scrofulous disease of the femur. The thyroid is very seldom, almost never, the seat of tubercle: and although that peculiar swelling called Bronchocele is not infrequent in those of a lax and infirm habit, and, in fact, in those who are suffering from scrofula, yet the origin and progress of bronchocele is so different from that of this disease generally, that we are inclined to view it as not of this nature.

When the tongue is affected by scrofula, blisters or apthous crusts form, on the removal of which a sore is left, often very difficult to heal. Its more characteristic features are described as small knots or nodules superficially imbedded in the substance of the organ, varying in size from a grain of small shot to that of a horse-bean. They cause no uneasiness unless when firmly pressed, and then the pain is pricking. The mucous membrane covering them is red and prominent, and soon breaks in the centre, giving rise to an ulcer which spreads and destroys by sloughing erosion, with much pain, profuse salivation, furred tongue, and fetid breath. (*Cyc. Pract. Med.* vol. iii. p. 707.) In some protracted cases, the tongue is the seat of an albuminous exudation: when this occurs, there are almost invariably prickings in the tongue, heat, and redness. This exudation occasionally occurs in the form of patches from two to three lines in surface, which occasionally by their reunion completely cover the tongue: at other times it assumes the form of small points more or less thickly scattered, and attended by destruction of the corresponding mucous membrane. The redness, heat, and prickings, together with the albuminous nature of the secretion, distinctly point out an inflammatory condition, and yet the mucous membrane of the tongue beneath the exudation is often observed to be quite pale.

In children the spleen is very frequently scrofulous, but in adults this is but rarely met with. Small masses of the size of a pin's head or hemp seed are deposited in the cells of the organ: occasionally, however, it is almost entirely filled with large masses.

In the pancreas, according to Lombard, scrofulous disease occurs more frequently than is supposed by other writers. Of one hundred dying scrofulous, in five he found the deposit in this organ. Dr. Carswell, on the other hand, says, he has never observed it in the human subject, and only once in the monkey.

The liver, though functionally so much deranged, is not very frequently found in a scrofulous state. Lombard, in those he examined, never observed

it: Dr. Carswell has met with it in children, in the form of small masses, but has never seen it in adults. In these cases, tuberculous deposits are generally found in other organs at the same time.

Scrofulous disease of the lungs, from the frequency with which it takes place, and the importance of the organ affected, requires the most serious consideration, though it would be here out of place to enter into any history of its progress in this organ. (See *Tuberculous Disease of the Lung.*)

Though cases are mentioned of its occurrence in the circulating system, yet they are not frequent. Wiseman speaks of a scrofulous tumour of the heart weighing two ounces. Mr. Lloyd has observed it occurring in the granular form in the heart of a rabbit. It has also been observed circulating in the general mass of the blood; and occasionally, though very rarely, has been met with in the muscles. (*Otto, Lombard, Laennec.*)

The organs of generation, both in the male and female, are very subject to scrofula. Tubercle has been observed in the bladder and ureters; cystitis is frequently owing to this deposit. It has also been observed in the vesiculæ seminales, in Cowper's glands; and Baillie says, that on cutting into the prostate, he has seen curdy matter precisely similar to that formed in the scrofulous absorbent gland, and that on pressure he has forced from its ducts a scrofulous pus. (*Morbid Anatomy*, p. 291.) Mr. Lloyd relates a case of phthisis, in which there was a difficulty in passing water for some time before death; the prostate gland was very much enlarged, and contained above an ounce of scrofulous matter. In another case it was so much enlarged, that on examination *per anum*, its boundary could not be reached by the finger, and it pressed so much upon the sacrum, that the finger could with difficulty be passed between them. (*Op. cit.* p. 110.) These cases are generally attended by gleet, which is often so much increased on sexual intercourse, as to assume almost the appearance of a virulent gonorrhœa, accompanied by much painful irritation about the neck of the bladder and through the course of the urethra. The testicle is also occasionally affected. The appearances on dissection resemble those exactly of a scrofulous gland. The first appreciable symptom is geral enlargement, with increased softness of the organ; its natural shape is not altered. In the early stage, there is no pain unless pressed, and then it is very trifling; but when the coats of the testicle are diseased, the pain is very severe. The progress of this affection is marked by inflammation of this gland and scrotum, the formation of abscess, and a consolidating together of the whole diseased parts. It runs the usual course of scrofulous disease in glands, and does not require castration, as is the case when the testicle is the seat of more inveterate affections.

In the female organs, very troublesome affections result from scrofulous diseases. The whole lining membrane of the vagina often becomes affected, and occasionally the interior of the uterus is involved. The character of the discharge from the vagina is altered; it assumes a greenish yellow, often streaked with blood, and very acrid in its character, causing irritation, excoriations, and eruptions of a most troublesome description. This state of things is the source of much catamenial derangement, and not infrequently of many anomalous pains of the back and other hysteric affections.

Scrofulous disease of the mamma is not uncommon both before and after puberty. Its first symptom is a small oval movable tumour: this increases, and is followed by others. Unless there be inflammation, but little pain or inconvenience is felt. Should inflammatory action supervene, the swellings increase, and involving much of the gland, suppuration takes place, which eventually is discharged by two or three openings.

The brain and its membranes are more frequently the seat of tubercle than is generally supposed. When it occurs on the dura mater, the masses resemble precisely the structure of a scrofulous absorbent gland, and, like them, a curdy pus is often found in their interior. The occurrence of tubercles in the brain has never been sufficiently attended to. Dr. P. H. Green has made some

very valuable observations on this subject. He affirms, that a long and laborious investigation of this interesting subject enables him to conclude, that, in point of frequency, the occurrence of tubercles in the brain in children must be ranged next to hydrocephalus; and that for every three cases of the latter disease, there exists one of the former. (*Lancet*, Feb. 1839.)

On the other hand, tubercles in the brain in the adult subject are extremely rare. Of 117 phthisical patients examined by Louis, one only had tuberculous deposit in this organ. They often exist without producing any disturbance of the cerebral functions, and are only discovered after death. The most prominent symptoms which mark their presence are, — a constant or remittent headach, more or less intense, sometimes occupying the frontal region, at others corresponding exactly with the seat of tubercle; chronic vomiting occurring at uncertain intervals, and not apparently connected with disorder of the alimentary canal — a symptom, which when conjoined with headach and constipation of the bowels, is of great value; some disorder of the motor power, manifested by irregularity of the gait, an incapability of harmonising the movements, partial paralysis, or a contracted state of one of the limbs. The intellectual functions are seldom disturbed in the early stage; but as the disease advances, more or less change takes place, irregular accessions of fever (which is often mistaken for the infantile remittent) occur, with delirium at night; and in some instances the patient is gradually reduced to a state of complete idiotcy.

Tubercles of the brain, in children, commonly destroy life, either by inducing acute hydrocephalus, or by exciting inflammatory softening of the surrounding cerebral structure. Indeed, the relation between acute hydrocephalus and tubercle is much more close than has been generally admitted.

Scrofulous affections of the organs of sense are not infrequent. Of the eye we have already spoken. In the ear it frequently commits great havoc, both before and after the meridian of life. Thomson says that scrofulous affections of the ears often run in families, so as to produce a family deafness.

The inflammation succeeding the tuberculous deposit in this delicate organ, is followed by suppuration, which destroys the tympanum, and the small bones come out. The delicate expansion of the auditory nerves, or the membranous linings of the different cavities, are either partially or wholly destroyed, thus producing partial or total deafness.

The *nature* of tubercle has recently been successfully investigated by various pathologists. Tuberculous formation differs in structure and appearance from all parts of the healthy body. It is an adventitious deposit, and is the distinguishing characteristic of scrofulous disease. Dr. Carswell defines it to be a pale yellow, or yellowish grey, opake, unorganised substance, the form, consistence, and composition of which vary with the nature of the part in which it is formed, and the period at which it is examined. He states it to occur in four principal forms, which are, — 1. in distinct round bodies, to which the name tubercle is properly applied; 2. in masses, which vary in size, and are commonly of an irregular shape; 3. diffused through the structure of an organ, when it receives the name of tubercular infiltration; and, 4. when part or portion of an organ becomes converted into this morbid structure.

The tubercles when first recognisable are about the size of a small pin's head, sometimes of a reddish drab or skin colour, sometimes grey or ash, and sometimes, though very rarely, devoid of colour, and very transparent. They are irregular in their outer aspect, of a firm consistence, not easily compressed, and adherent to the neighbouring tissue. They occur in this state either singly or in numbers, and are known by the terms miliary or granular. In this state they frequently remain for a long period. When they increase, they take on a whitish yellow appearance. They rarely attain, as true tubercles, a larger size than that of a pea; though there are instances of their having attained the bulk of a hen's egg. When they are of the size of a pea, and have a yellow appearance, they are said to be in a crude state; shortly after attaining this, a slight appearance of softening is perceptible.

According to Laennec, the softening commences on the interior; according to Andral and others, on the exterior. It is the commencement of the last stage of tubercle; and, after a short time, it becomes broken down and converted into a fluid of a thin serous consistence, having a curdy-like mass floating in it. Mr. Calder recognises an appearance of tubercular deposit which is earlier than the miliary: he has observed in the peritoneum, mingling with the tubercles, many greyish coloured spots of the size of pins' heads, not sensibly elevating the peritoneum, but distinctly visible through it. These spots, when more minutely examined, have a roundish shape and a distinctly circumscribed edge, and, when divided by a fine cutting instrument, can be satisfactorily ascertained, both by sight and touch, to be a substance, and not a mere appearance. These, Mr Calder has frequently observed in the subserous tissue of the lungs and intestinal canal; and from his never observing them but in connection with decided tuberculous disease, he is inclined to refer them to an earlier stage of tuberculous deposit than the miliary tubercle itself. (*Med. Gaz.* 1837-8.)

Tubercles occasionally go through a different series of changes: instead of passing into the cheese-like matter, they are submitted to what has been termed a cretaceous transformation. This change is attributed to the tubercle losing a portion of its animal constituents, thus acquiring an excess of its earthy particles (phosphates and carbonates of lime). Tubercles in this state present an appearance of a dirty white coloured mass, like wet plaster of Paris.

Tubercle acts occasionally as a local irritant, producing the ordinary effects of inflammation, and eventually abscess, in which pus and tuberculous matter are mingled together. The cavity of the abscess is lined generally by an adventitious membrane, which, if not mucous, is not very dissimilar to it.

The tubercular masses are generally caused by the agglutination of a number of the miliary points.

The interstitial infiltration of tuberculous matter, whatever may be the form under which it is developed, according to Laennec, presents, at first, the appearance of a grey semitransparent substance, which gradually becomes yellow, opake, and very dense. This state rarely exists, unless tubercles in the miliary form are also present.

Sometimes the natural structure of an organ appears altogether absent, tuberculous matter being deposited in its place. This most probably occurs, not by a true conversion, but rather from an absorption of the natural structure in consequence of the deposition of the morbid substance.

The *origin* of tubercle is a matter of great interest. Very opposite views have been entertained upon it. The one, that their origin is inflammatory (*Broussais*, *Alison*, *Louis*): the other, that they are in no way dependent upon it (*Bayle*, *Laennec*, *Lobstein*, *Gendrin*); and that, if inflammation be present, it is the effect, and not the cause, of tubercle. We shall endeavour, in as short space as possible, to explain what appears to be the more probable view of the question. Before the formation of yellow tubercle, an induration takes place, which differs from healthy structure by containing a larger quantity of a matter which is harder than the tissue itself. Dr. Williams (*Med. Gaz.* 1838-9.) reasons very fairly upon this—that the increase of substance argues either increased secretion or diminished absorption. That absorption is not diminished in the tissues, is plain, from the fact that portions of the healthy tissue are at the same time removed by this process; and that increased secretion is present, is proved by the fact that the indurated texture presents new characters, and is not a simple accumulation of the matter of the natural tissue. There can be no doubt, according to the laws of physiology, that where increased secretion is present, there must be a larger supply of blood, which larger supply amounts to an inflammation, though of a low and generally of a chronic character. The discussion of this question, however, would occupy too great space: we shall therefore briefly state, that we believe tuberculous or scrofulous disease to arise from a low inflammatory condition of the interstitial tissue, in

consequence of which lymph of so low vitality is exuded, that it is incapable of becoming organised, or, at least, susceptible of it only to a very low degree.

With regard to the original seat of tubercle, some difference of opinion prevails. Dr. Carswell states, that repeated, careful, and minute anatomical researches have led him to regard the free surface of the mucous and serous membranes, and the blood, as the exclusive seats of the tuberculous matter; and that in no instance is this morbid product deposited in the molecular structure of organs. We have previously mentioned that Dr. Alison observed tuberculous matter existing in a free state in the air-cells. Mr. Calder, premising there may be some misunderstanding about the term free surface, maintains that tubercles are always invested by cellular membrane.

The *composition* of the tubercular deposit is chiefly albumen with varying proportions of gelatin and fibrin, together with the phosphates and carbonates of lime, which occur in the same proportions as they are met with in bones. According to Thénard, one hundred parts of crude tubercle (pulmonary) contain

Animal matter - - - -	98·15
Muriate of soda, Phosphate of lime, Carbonate of lime - - -	1·85

and some traces of oxide of iron.

Scrofula readily associates itself with, and modifies the progress of, other diseases, more especially common inflammation, syphilis, diseases of the skin, rickets, and certain local and nervous maladies. Indeed, very few local inflammatory affections occur, in which the symptoms, as well as the operations of food and medicines, are not more or less influenced by the scrofulous constitution; and it is from this complication, that sores and many other similar affections are so obstinate of cure. Gonorrhœa and the diseases of the mucous membranes generally offer striking examples of this fact. Scrofula and syphilis modify each other very remarkably; generally, both diseases run their course under mutual states of aggravation. Sometimes, however, the tubercular disease is arrested during the progress of this affection; on the subsiding of which, the scrofulous symptoms are renewed with redoubled aggravation. (Royer, *Obs. ex Praxi in Nosoc. Milit.*)

With some diseases of the skin, the complication is so frequent as to induce many writers to view them as essentially scrofulous. It is very certain, that when they do occur in a constitution of this tendency, they are aggravated in character, and more obstinate in resisting curative means.

Rickets, by many writers, has been erroneously esteemed a scrofulous disease: not only is its pathological state opposed to such a view, but it occurs occasionally in children, in whom there is not the slightest tendency to scrofula. Should it, however, be complicated with tuberculous disease, its treatment becomes troublesome and unsatisfactory, which otherwise is not particularly the case.

Scrofula is often combined with uterine affections. It has previously been observed, that, in persons of this diathesis, great tendency to catamenial irregularity prevails: generally, the recurrence of the period is too frequent, and the discharge excessive. The constitution soon shows evidence of its labouring under the weakening effects of menorrhagia. On the other hand, it sometimes happens, though much less frequently, that there is a total suppression of the discharge, or its recurrence takes place only at lengthened periods, and attended with more or less pain.

The scrofulous constitution is very liable to nervous disorder. In females of this habit, the symptoms are so often mingled with those of hysteria, as to render it difficult to distinguish which are to be referred to organic affection, and which to mere complication.

With regard to mental disorders, Dr. Cumin says they claim an alliance with scrofula which has not been sufficiently attended to. He states, on the authority of a physician eminent for his knowledge of these disorders, that more

than one half of those who are subject to mental derangement, are of a scrofulous constitution, the existence of which is manifestly indicated in these persons; and that scrofulous symptoms often alternate with attacks of mania; that purulent expectoration has often ceased during the urgent symptoms of insanity, and, on the other hand, reason has been restored before the pulmonary disease proved fatal. With the view of elucidating this, Dr. Cumin examined all the paupers of a lunatic establishment. Of forty-four females, exactly one half presented indurated or enlarged glands of the neck or throat, and several had extensive scrofulous cicatrices. Of forty-six males, twenty-eight had no decided symptoms of scrofula, though several had the strumous aspect; sixteen presented the marks already mentioned: in reference to the females, two belonged to families known to be afflicted with scrofula in an aggravated form. All of these ninety lunatics were adults, and not one of them exhibited any active symptoms of scrofulous disease. It appears, however, from the above, that mental disease is not promoted by scrofula, though occurring in the same subject, nor scrofula promoted by mental affections; on the contrary, when one disorder was in a state of activity, the other was at its minimum intensity: in confirmation of this it has been observed, that where insanity has occurred in families eminently scrofulous, the least strumous were its victims.

Epilepsy is another occasional complication of scrofula. Dr. Cheyne goes so far as to think it as certain a manifestation of the strumous diathesis, as tubercular consumption itself. We cannot, however, view it in so strong a light. There can be no doubt that many, nay most, so afflicted, present strong characteristics of the strumous constitution; but, on the other hand, it occurs in those who can in no way be said to have this taint.

The *statistical history* of tuberculous disease has, of late years, being occupying much attention; but as the results obtained have been rather deduced from those labouring under phthisis pulmonalis, it would be out of place here to go into minute details; a few general remarks will be sufficient.

Tubercles are generally stated to be but vary rarely developed until after the second year of life. We are inclined, however, to doubt the correctness of this opinion. Occasionally they are met with in the fœtus. Chaussier, Œhler, Husson, Billard, have each detailed cases; yet Guisot states, that of 400 newly born children whom he had examined, he had not met with a single case. Billard relates instances of tuberculous deposits in the first months of life. We have examined infants in whom tuberculous disease was not suspected, and yet the deposit was found largely diffused in several organs. This leads to the conclusion that infants succumb to the influence of this affection more frequently than is suspected. Billard states some observations which fully bear out this view. He found tubercles in the lungs of four children who died at the respective ages of one, two, three, and five months, in neither of whom were any of the symptoms of phthisis developed as is usual in adults. The observations of Sir J. Clark tend to the same effect: he met with many cases of extensive tuberculous disease in the first dawn of life. After the second year, however, there is a great increase in the developement of tubercle. According to Guersent, of those who died between one and sixteen at the Hôpital des Enfans, two thirds or five sixths were tuberculous: and Dr. Alison states, of the lower orders of children in Edinburgh, more than one third of the deaths are from scrofula. Sir J. Clark has given a table which, as deduced from a large number of observations, is most probably accurate in its results; it is calculated from 695 observations made by Papavoine and his colleagues, from which it appears that the period of life before the fourth year is the most prone to tuberculous disease. To speak, however, in general terms, it appears that scrofula exists in its greatest extent between the period of the first and second dentition.

Le Pelletier affirms that the number of strumous females as compared with males is as five to three. (*Sur la Maladie Scrofuleuse.*) This, however, is very much greater than is found to exist elsewhere. From another table of Sir J.

Clark, and constructed from the returns of thirteen different hospitals, the proportion is found to be in seven of them much in favour of females: taking, however, the thirteen returns, and drawing the average from the whole, the prevalence of tuberculous disease bears the relation of 100 males and 106 females. In connection with this it must be borne in mind, that on the whole population there is an excess of females over males, and this may render it a nearly equal division of disease. In Dr. Home's report (*Edin. Med. and Surg. Journ.*) a contrary result, however, is shown to be the case; and this is not owing to the admission of a larger proportion of males into the hospital,—the numbers being, males 4512, and females 4749.

Tuberculous disease is not confined to man. Farcy and glanders in the horse are both essentially scrofulous diseases. Dupuy has shown that, in the latter, the leading feature is the formation of tubercle in the pituitary membrane (*Maladie Tuberculeuse*); while, in the former, the tumours called farcy buds are really tuberculous deposits. A large proportion of those animals which are imported into this country for the purpose of menageries, die from tuberculous disease. This is especially the case amongst the monkey tribe. Regnaud, who has had frequent opportunities of dissecting those dying at the Jardin du Roi in Paris, states that the disease, as occurring amongst them, is in every way analogous to its appearance in the human subject. We have enjoyed some limited opportunities of observing the same fact in monkeys, two lions, and a kangaroo. In each of these the tuberculous disease was fully developed. (*Arch. de Méd.* t. xxv.) The cows which are confined in large towns are found soon to show evidence of this complaint; and it is remarkable, on this occurring, the milk becomes more abundant. The flesh also becomes softer, and in Paris is prized in proportion.

Mr. Newport has made some very interesting observations on the occurrence of tuberculous formations in insects, both vegetable feeders and carnivorous. He was enabled to produce its deposition by submitting the insects to changes of temperature, and supplying them with food of a deteriorated quality. From the result of an experiment upon the larvæ of the *Sphinx ligustre*, he is led to conclude that these depositions in insects may be produced almost at pleasure. About eighteen or twenty larvæ of this species, collected just after entering their last skin, were confined in a box closely covered, and kept, uncleansed, in a room the temperature of which ranged from 65° to 80° Fahr., and were supplied with food of a deteriorated quality. By this means their growth and the period of their changing were retarded. In order to produce a sudden impression of cold upon them, they were repeatedly plunged into cold water. The result was, that in the whole of them deposits were formed, and generally in the secreting organs. (*Mr. Newport's Letter*; vide Clark, *op. cit.*)

Causes. The frequency of scrofula, the insidiousness of its approach, and, when fairly set in, its inveterate nature, render an examination of its causes of the utmost consequence. We have already shown that scrofula is a disease of a tuberculous nature; and the probability that the immediate origin of the characteristic deposit is due to a chronic, low, inflammatory condition of the interstitial cellular system, by which means albuminous deposit takes place from the blood. We shall now turn our attention to those agents which have been considered to excite such a condition.

The first in importance is hereditary influence. Different opinions have prevailed upon the relative importance of this; some maintaining that it is essentially and only of hereditary origin; some, that it is never so; and others, that it may be both hereditary and capable of being spontaneously excited. Much difficulty has ensued from confusing together hereditary disease and hereditary predisposition. (*Hunter's Works*, vol. i. p. 591.) Faur, White, Diel, Henning, and John Hunter, are among those who have most prominently opposed the view that scrofula is hereditary. The latter however, while maintaining this, allows the existence of an hereditary predisposition. Dr. Thomson, whose writings are as clear as they are accurate and instructive, puts the whole question in its

proper point of view. "It had from time immemorial been observed that the children of those parents who themselves have had scrofula become sooner or later affected with this disease; and from this uniform observation and experience it was inferred, that scrofula was an hereditary disease. This conclusion however has been denied, upon the grounds that children are never born with the disease actually existing, and that it is improper to give the name hereditary to a disease which is not immediately communicated from the parent to the child. By keeping in view the distinction I have already mentioned, of scrofula as a disease which has actually manifested itself by attacking some part of the general system, and as a predisposition, diathesis, or state, liable to be attacked with, or to pass into, the disease, you cannot fail to perceive that the dispute with regard to the hereditary nature of scrofula is merely a strife about words; and that this controversy must cease, as soon as you affix any thing like a precise and determinate meaning to the terms which you employ. If by applying the word hereditary to scrofula you mean to express that the disease is communicated directly by the parent, so as to appear in the child from the first moments of its existence, or, in other words, that the child must actually be born with the disease obviously existing, the question, it is evident, whether scrofula be hereditary or not, can only be resolved by an appeal to experience. I have not heard of any very decided example of a child being born with scrofulous glandular tumours on any part of the body, though the circumstance does not in itself appear to be at all impossible." The acumen of this intelligent physician has been fully borne out by the observations of Langstaff. Husson, Ohler, Andral, &c. who have detected tubercles in the fœtus. Though there can be now no doubt that both the predisposition, as well as the disease itself, may be derived from the parent *, there is also every reason to suppose that it is not exclusively so, as is stated by Le Masson, Delalande, and others. In fact, there can be little doubt that tubercular disease is both hereditary and capable of being acquired. Cullen, who has a strong bias in favour of viewing it exclusively as of hereditary origin, allows that it sometimes may be otherwise. Admitting it to be hereditary, some have attributed its origin to impregnation taking place during the menstrual period, in the parents being either too old or too young, or to accidents during gestation. These views, however, are supported by no solid arguments.

The Faculty of Medicine in Paris, in 1578, decided that scrofula was contagious: this view is scarcely entertained in the present day. Those who consider it so, mention as the media — intercourse (*Pujol*), inoculation with small-pox (*Deluc*, *Rowley*, *White*), and nursing (*Bordeu*).

That it is not communicated by intercourse, every day observation is sufficient evidence. Baudelocque quotes the fact, that in the Hôpital des Enfans 150 beds are occupied by children, some of whom are scrofulous, yet no result of the kind has ever taken place. The same negative evidence is afforded at the Hôpital St. Louis, where they are indiscriminately mixed.

Rowley, White, Dehaen, are those who chiefly maintain that scrofula has been introduced into the system with the matter of small-pox. No sufficient grounds however have been stated, which should induce us to believe that it makes its appearance more frequently after inoculation than after natural small-pox. We may indeed conclude from the following experiments, that it is not inserted with the variolous matter; for, in order to test this view, the endeavour has been frequently made to introduce this disease by artificial means. Hébrèard and Lepelletier inoculated animals with the virus without success. Kortum and a colleague of Lepelletier experimented (most unjustifiably) upon children, while Lepelletier and Goodlad did the same upon their own persons with the like result. The humoral pathologists have very generally maintained, that scrofula may be communicated to a child by a nurse embued with the disease. Be this as it may, it must be admitted that a nurse of a scrofulous constitution is objectionable; for, as Labillardière has shown, the milk of a cow affected by

* Tuberculous matter has been found in the umbilical cord.

tuberculous disease contains at least seven times more earthy matter than a healthy one, and consequently is less nourishing.

Many have thought scrofula to be a degeneration from the syphilitic virus. The question is important, not only from the authority of those who support it, but from its involving the whole question of the nature and treament of scrofula. It was first entertained by Astruc, and in the present day we find amongst its advocates such names as Hufeland, Richerand, and Alibert: the latter states, by far the greater proportion of scrofulous disease to be only disguised cases of syphilis, which is modified by hereditary transmission: he feels assured that its occurrence in children is almost entirely owing to the debaucheries of their parents.

Notwithstanding this array of important names, we find little in their works on the subject, save the mere assertion, and which chiefly rests on the similarity of certain symptoms. Attentive observation, however, discovers sufficient to negative the views of their identity. Besides, we see that the children of syphilitic parents are born with the disease upon them. Bierchen, who maintains that the disorder of such children is scrofula, has evidently erred in his diagnosis; and what he calls scrofula is doubtless no other than syphilis.

The experience of Baudelocque is, that children born of mothers infected with syphilis are not more prone to scrofula than when this is not the case. Another reason which has been advanced (insufficient even if the fact were substantiated) is, that the same remedies are applicable to both disorders. We shall have an opportunity of showing, when detailing the treatment, that there is every reason to believe the contrary to be the case; an opinion maintained also by Richerand, one of the chief advocates of the view of syphilitic degeneration. As further negativing such a position, we may allude to the circumstance of scrofula being known in Europe long anterior to the introduction of syphilis.

The external agents generally regarded as the exciting causes of scrofula are peculiarities in diet, situation, and atmosphere. Bad diet has usually been stated to exert peculiar influence. Though there can be no doubt that the disease greatly prevails amongst the ill-fed poor, yet on examining the question more fully, it would seem that the effects of diet have been greatly exaggerated, as the disease exists to a great extent amongst the well-fed also: in fact, were we to take our examples only from those in a parallel walk of life, the contrary conclusion might be stated as the correct one, for the poor of towns, who are much better fed than the poor in the country, are the more prone to it. Baudelocque, who states a vitiated atmosphere to be the sole exciting cause, and has analysed all the other theories, in order to dispute them, brings forward many strong facts in favour of this position. He contrasts the scrofulous liability of the children of artisans in Paris with those in Picardy. The former who are well-fed are frequent victims of the disease, while the ill-fed enjoy a comparative immunity; and he quotes the memoir of Madier on the medical topography of Bourg. St. Andeol, where it appears that food is good, abundant, and cheap, where situation and all other circumstances concur to produce a healthy district, yet the disease is found to be very common amongst the inhabitants; and Bordeu states the more conclusive fact, of the sons of mountaineers who are sent into towns to qualify themselves as churchmen, and are better fed than their brothers in the mountains, and yet frequently become scrofulous, which is rarely the case with the others. At Palermo it is very notorious that the food is of the most innutritious and worst kind, yet among its inhabitants the disease is almost unknown.

Many writers have specified diets of particular kinds as sources of its origin. Haller and Hufeland attributed its occurrence to the use of potatoes. The latter also attributes it to mothers not nursing their own children, but bringing them up by hand. In Normandy however, where it is much the custom to rear children after this fashion, scrofula does not particularly prevail. The opinions with regard to diet have varied with the prevailing theories of

the disease. If it have been attributed to the presence of acid or calcareous salts, so importance has been given to food containing these ingredients: if its origin have been thought to exist in the secretion of thick viscid lymph, so any thing causing a thick chyle, as soups, potatoes, &c. have been condemned. Milk by some is regarded as injurious, because it produces acid (*Bordeu*); while others look upon it as anti-scrofulous. The use of tea, coffee, an undue proportion of fluid to solid food, the inordinate employment of purgatives, spirits, &c. have each been severally stated as capable of producing the disease. It is useless, however, to quote at length these opinions, for it appears evident that scrofula attacks indiscriminately the well and ill-fed, and that no particular diet gives an immunity. At the same time it is not to be denied, that when scrofulous action is excited, diet of an innutritious and unwholesome nature is exceedingly hurtful, and tends much to its aggravation.

The use of particular kinds of water has been so seriously dwelt upon by many as a chief exciting cause, that an examination of its true bearing is necessary. Our own most excellent physician Dr. Heberden, states his belief that it is probably owing to the existence in it of some noxious quality, and quotes in confirmation the history of the occurrence of scrofula at Rheims. The circumstances may be thus briefly stated:—This city was so afflicted with scrofula as to have a hospital, St. Marcon, specially devoted to cases of scrofula, when a citizen from pure benevolence introduced into the town the water of the Vesle, it previously being but ill and scantily supplied by tanks. Immediately on this taking place, according to Thouvenel, scrofula almost entirely ceased. This statement was made in 1777. In 1806, Desgennettes reports that the hospital is again filled with scrofula, and that the water-works of the Vesle are so out of repair as to supply but little water, obliging the inhabitants to resort to their previous sources of supply. So far it appears conclusive, but the searching investigation of Baudelocque throws doubt upon the whole. He shows that the decrease of the disease commenced before the waters of the Vesle were brought into the town; and that there is every reason to believe that the decrease was attributable rather to some general improvements in the place, while its recurrence is due to the establishment of manufactures. Snow and ice water have by many been considered as a cause; by others, waters containing lime; this latter view has lately been very ably sustained by Mr. M'Clelland in his sketch of the topography of Kemaon. (*Dub. Journ.* May, 1837.)

Want of cleanliness has been very generally considered as a cause, and Kortum explains this by supposing that it opposes free transpiration; but we see that scrofula occurs in those who are not uncleanly. The children of Palermo, to whom we have before alluded as enjoying a peculiar immunity, are notoriously living in a state of the most squalid filth; on the other hand, the children of this country and of Holland, where the disease finds so many victims, are those of all others where cleanliness is most attended to.

The nature and variations of the atmosphere are also said to exert a powerful influence — a view which is by no means improbable, when we reflect that it is the medium by which light and heat, moisture and electricity, all such important agents as regards the animal economy, are applied to the system. Considering the importance of the question, it has not been so philosophically examined as might have been expected. The very excellent work of Dr. Edwards (*Influence of Physical Agents, on Life*) promises however to create a new era in these researches.

With regard to the effects of light and electricity, but very few observations have been made. Humboldt thinks he has remarked that a diminution of electricity in the atmosphere concurs to the development and progress of scrofula. The influence of this agent, however, has not been so examined as to induce any reliance to be placed upon this vague opinion. Observation has shown that light produces very serviceable effects upon vegetable existence; and judging from analogy, we are induced to infer that it exerts some influence on the animal economy. Dr. Edwards has proved this by direct experiments, the

results of which are, that the presence of solar light favours the development of form as contra-distinguished from size merely (p. 210.); and the principles deduced involve the opinion, that in climates where nudity is not incompatible with health, the exposure of the whole surface of the body to light is very favourable to the regular conformation of the body; while, on the other hand, we must also conclude that the want of sufficient light must constitute one of the external causes which produce those deviations of form in children affected with scrofula, which conclusion is supported by the observation, that this disease is most prevalent in poor children living in confined and dark streets (p. 211.). Daily observation, doubtless, shows us that those who are placed in situations where light is deficient, such as miners, prisoners, &c. are etiolated, unhealthy, and prone to scrofula: but many other deleterious causes are united in those unhealthy situations, so that their effects cannot be separately estimated; nay, it may be adduced as an argument almost conclusive against the agency of light, that many districts which are particularly liable to scrofula are open to the direct rays of the sun. This is especially the case in the district of the Rhone, where the occurrence of cretinism is so frequent. Moreover, the experiments of Dr. Edwards, though showing that an influence of a powerful nature is excited by light, tend to prove that a deprivation of it would not produce scrofula, for whatever changes took place under these circumstances, they in no way proceeded from a decay of the individual.

Baudelocque says, that, of itself, temperature exerts no influence in the production of scrofula: it certainly is not a disease of either warm or cold latitudes, occurring chiefly in temperate climates. At the same time he remarked, that in the hospitals of Paris, winter exercises a very unfavourable influence on those suffering from this disease; that the ulcers suppurate more abundantly, the swellings become more numerous, and obstinate diarrhœa opposes the effects of anti-strumous medicines. He does not admit, however, that this is owing to the change of temperature, but to the imperfect manner in which hospitals are heated and ventilated, thus causing those suffering under the disease to lie long in bed, by which means they inhale a vitiated atmosphere, and are deprived of proper exercise. In confirmation of this view, of its not being owing to the climate of winter, he says that none of these ill effects are found to arise in cases where means are taken to guard against the immediate effects of cold.

If we view humidity as distinct from temperature, it cannot be said to be a source of this disease, for there are many districts where moisture greatly prevails, but which are not particularly characterised by the occurrence of scrofula. We might name the departments of Somme, Boves, &c. In this latter place, notwithstanding its being built in the midst of a morass, formed by the junction of two rivers intersected by three streams of water, and surrounded by canals and pools, so that fogs prevail to a great extent, in fact, presenting every condition of a humid climate, there are found but very few who are scrofulous; while, on the other hand, it has been observed that the inhabitants of many places remarkable for dryness are particularly liable to this disease.

There can be no doubt, however, that temperature and moisture combined exert a considerable influence on health. A temperate and moist climate presents that condition which, from its changeableness, is likely to be a source of disease generally, but especially of the disease under discussion. At the same time the department of Picardy, where such a climate exists, is not prolific in cases of scrofula, excepting amongst those whose occupations confine them to their houses. Baudelocque, to whose views we shall immediately refer, attributes its origin to the inhaling a vitiated air, and very ingeniously observes, that these climates induce the building of small and ill-ventilated houses — whence the disease; that its absence is accounted for in warm climates by the inhabitants being chiefly in the open air; and in cold latitudes by the great and effectual changing of the air, caused by the general use of fires in the rooms inhabited, so that the consequences of a vitiated atmosphere are avoided.

That a vitiated atmosphere exerts some influence in the production of scrofula, is an opinion that has been entertained by many. Baudelocque devotes a large portion of his work to show that it is exclusively the exciting cause. " The occurrence of scrofula is always preceded by a residence, more or less prolonged in an atmosphere which is not sufficiently renewed. This cause is the only one to be met with, whether isolated or united to conditions whose action is only secondary." (*Op. cit.* p. 264.)

Without taking so exclusive a view of the origin of this disease, many circumstances give much ground for supposing this cause very influential. The poorer classes of large cities, who are frequent subjects of its ravages, notoriously live in rooms and situations which are not well-ventilated; and Richerand states that a considerable proportion of scrofulous cases which are admitted to the Hôpital St. Louis come from those quarters of Paris where, from the height of the houses, and the crowded character of the district, there can be but a limited supply of fresh air; and that at Troyes in Champagne, where many circumstances combine to make the atmosphere close, scrofula exists to a great extent. Baudelocque attributes the occurrence of the disease in the upper classes to the confined sleeping rooms they often occupy, the length of time passed in bed, and the not infrequent customs which children have, of sleeping with the head beneath the bed coverings, or deeply buried in a soft pillow.

At Bourg. St. Andeol it would appear that a vitiated atmosphere is the chief, if not the sole, origin of the disease. The air, water, and food, are good; its situation is healthful; and there appears so little cause to account for its origin, that Madier is induced to attribute its frequent occurrence there to the presence of strangers. It is, however, stated that the streets are narrow, the houses high; and that, besides these causes of a want of ventilation, the air is vitiated by the effluvia emanating from domestic animals, which they keep in courts attached to their houses, and from silk-worms which are fed in great numbers within doors. Alibert observed that, at Mende, those workmen employed in the woollen manufactory and confined in close rooms are frequently afflicted; while those in open shops enjoy an immunity. The same is observed by M. Regnault to be the case at Aubigny; but the most conclusive fact in favour of this view occurred at a village called Oresmeaux, about nine miles from Amiens. It is situated in a large plain, exposed on all sides, and about one hundred feet above the level of the neighbouring valleys. The houses, built in the earth, lighted by one or two pieces of glass fixed into the walls, with floors some feet below the level of the soil, and low ceilings, were ill-ventilated in the extreme. Nearly all the inhabitants of this little village were afflicted with scrofula. A fire destroyed it; it was rebuilt by houses of a more airy description; since which time the disease has gradually subsided. It may now be said to have disappeared from that part of the country.

Prevention. There are three points to be particularly attended to in the prevention of scrofula:—1. Where a taint of the disease evidently exists in the mother, that the state of her health during the period of utero-gestation should be regarded with the most jealous care. 2. That, on the birth of the child, if either parent should have strumous predisposition, prophylactic means must be resorted to during the early years of life. 3. In cases where there is no hereditary predisposition, but locality or other external agents appear the source of the disease, these must be obviated.

1. Females are not, for the most part, sufficiently impressed with the influence exercised by their own state of health, during pregnancy, on the offspring they are carrying. This applies generally; but when the system is imbued with disease, the fœtus is in a condition to receive any morbid impression much more easily. It would be useless here to lay down any series of rules. Particular stress, however, may be laid upon the necessity of sufficient clothing, exercise in the open air, avoiding heated rooms and late hours, and abstaining from an indulgence in a full stimulating diet.

On a child being born of strumous parents, every means should be taken

as regards food, air, clothing, &c. to strengthen the general health, and to counteract the hereditary tendency. Should the father only be endued with the strumous habit, and the mother be in every way a proper person to nurse her own offspring, the infant should, by all means, derive its nourishment from her in preference to a stranger. If, however, the mother be scrofulous, a young healthy nurse should be substituted; and for the first six or seven months the infant should be entirely nourished from the milk so afforded: in the succeeding three or four months, the addition of other light and nutritious food should be resorted to in addition to that of the breast.

It is absolutely necessary that the wet nurse should not have given suck to her own child above a few weeks or rather days previous to the one she is to nurse; and, during the whole period of her supplying milk, she, as well as the infant under her charge, should occupy large and airy rooms, and should take regular exercise in the open air, attending especially to the state of the digestive functions. A very common error prevails, that women, during the time they are fulfilling this function, should take in more nourishment than is their usual custom, and that it should be of a more stimulating and heating nature.

About the age of ten months, or at the latest twelve, the infant should be weaned. Nothing conduces so much to produce a feeble frame of body as protracting the period of nursing. The milk after twelve months becomes poor and innutritious, causing in the child fed with it flatulence and indigestion.

The food, at this period, should in great measure consist of cow's milk together with light nutritious matters taken from the vegetable kingdom, with some very slight addition of broth. Dr. Paris strongly recommends milk impregnated with the fatty matter of mutton suet. It is prepared by inclosing the suet in a muslin bag, and then simmering it with milk. Where it is an object to introduce much nutritive matter in a small space, he is not acquainted with a better form of aliment. (*On Diet*, p. 220.) Dr. Cumin, who has made trial of it, fully bears out this recommendation; and says that it has a near resemblance to goat's milk, but that it has the advantage of being more astringent. He found it to be very useful in cases of scrofulous marasmus, when almost every other article of diet caused irritation of the bowels, and passed through them undigested.

The clothing of infants is of great importance. Dr. Edwards has shown that they neither have the temperature of adult age, nor enjoy the power of generating heat to the same extent. The practical applications which result from his observations are of the highest importance. He says with great justice, that if the attentions which children require in climates and seasons little favourable to the preservation of their existence were generally understood and put in practice, it would considerably reduce one of the most powerful sources of mortality affecting that age in our climate. Cold operates much more generally than is supposed, and often affects the constitution most seriously, even when its effects are not manifested by any immediate sensations. "They do not feel the cold, but they have an uneasiness or an indisposition which arises from it; their constitution becomes deteriorated by passing through the alternations of health and disease; and they sink under the action of an unknown cause. It is the more likely to be unknown, because the injurious effects of cold do not always manifest themselves during or immediately after its application. The changes are at first insensible: they increase by the repetition of the impression, or by its long duration; and the constitution is altered without the effect being suspected." (Edwards, *op. cit.* p. 265.) In those countries where, from the degree of cold, its effects are more sensible than with us, the necessity of guarding their children against its influence is fully appreciated. The result is, that in these colder climates this agent is a less frequent cause of mortality than amongst us. At the same time that it is necessary to watch the progress of the seasons, and to guard against the injurious effects of their climate, it is also of consequence to promote that state of the system which is favourable to the generation of animal heat, in order to

compensate for the abstraction of it by radiation, the temperature of our climate always making this a condition of our existence. This is effected by maintaining the organs of respiration and circulation in a state of vigour. The chief means which we have of promoting this are, exercise in the open air, living in apartments where ventilation is good, and the maintaining a healthy condition of the surface of the body. Immersion in cold water is useful to this end.

The importance of fresh air cannot be too strongly inculcated; the rooms occupied by those of a strumous tendency should be large, airy, well-ventilated, and not over inhabited; and of all things the child should not be confined in a cot or bed surrounded by curtains. The child of a country labourer, with every thing against him except that he enjoys fresh air, exhibits a vigour of health and appearance that is in vain looked for in those nurtured in the confined atmospheres of the nursery. Fresh air gives tone to the skin, vigour to the respiration, and conduces in great measure to a healthy state of the digestive organs.

As the infant advances to childhood, the same general rules are to be followed out. New faculties however come into play, whose progress should be watched with most jealous care. The development and management of the mind requires a constant surveillance. Parents are too apt to be led into error by the precocity of mind inherent in many of this constitution; and in place of curbing it, they excite its development at the expense of the bodily health. Nothing can be more injurious in the early years of life than that forced system of education which prevails in the present day: the head is developed at the expense of the body; and a child thus brought up presents the appearance of a weakly frame with precocious intellect. Eventually however these hopes are disappointed, for that state of intellect which should only have been the accompaniment of after and more mature years, fades into weakness and irresolution as manhood advances, that very period of life when the independence of intellect is required. A child with a scrofulous diathesis should learn its lessons in the fields, and not be bound down to books in the crowded atmosphere of a schoolroom. Amongst boys there is some relief and antidote to the disadvantages of the school system in the hours of exercise and free enjoyment both of body and mind when out of school. The whole period, however, of female school education is fraught with conditions the most obnoxious to the strumous constitution. Their rooms are generally confined and ill-ventilated, the use of stays, bands, and strings, prevents the free exercise of the muscles. In school and out of school it is one system of drilling and exhausting attention, either to mental or external qualifications; and the natural positions of the body, which are occasionally assumed to relieve the exhaustion of constraint, are reproved as unseemly and unlady-like. Then again, the course of study is so copious and extensive, that the energies of the mind are weakened by a succession of ever varying impressions.

Another point to be attended to particularly is the state of the moral feelings. Should they naturally be excitable, control must be exercised, but of that quiet and unsuspecting kind as not to irritate and wound. Children at an early age are much more susceptible of moral impressions than is generally supposed. On the other hand, should their tone be of a morose or apathetic nature, means should be taken to excite them to cheerfulness and activity.

We have hitherto been speaking of those in whom the scrofulous constitution may be, *à priori*, supposed to exist from the condition of their parents. We must not however forget that the disease arises as it were spontaneously: the circumstances connected with its spontaneous origin should be diligently sought for, and if possible removed. They will generally be found attributable to locality and errors in construction of houses,—ill-ventilated damp houses and confined localities are much more frequently, than is supposed, fruitful sources of scrofula.

Treatment. Perhaps no disease requires greater exercise of that peculiar tact which should characterise the physician, than those which are tuberculous in their nature. The character of the inflammation which is attendant on the development of tubercles rarely requires bleeding or purging, and the state of the constitution is such as generally to be injuriously acted on by a depletory course of treatment. Occasionally bloodletting may be sparingly employed on the advent of any decided inflammatory accession.

Strong purgatives are also particularly to be avoided. The observations of Louis on the frequency of tuberculous deposit in the membranes of the alimentary canal are sufficient to induce one to pause before their exhibition is resorted to. Independently of any local irritation they may be the means of exciting or setting up, their action upon the system generally is not beneficial: they tend to depress its powers, and derange its functions. Should alvine evacuants be required, which is very frequently the case, the safest and most convenient medicine to be administered is rhubarb with the addition of a little soda. We have also found the preserved walnut of great service in constitutions of this nature: it acts effectually, gently, and without leaving depressing results.

On the occurrence of any febrile accession, in preference to severe evacuants by bloodletting or purgatives, a saline treatment combined with antimonials should be resorted to. This has generally the effect of lowering the system sufficiently without tending permanently to weaken it.

Mercury in all its forms has been administered in cases of scrofula. Wiseman, Pearson, Curry, Carmichael, Lloyd, &c. have been strenuous advocates in favour of its administration. Others however, if not condemning, do not recommend it. John Hunter, the great advocate of mercury in syphilis, does not mention its employment, and in fact we may infer from his observations, that he was opposed to its use, for he says the remedies must be directed both to the constitution and to the part affected: but, if we had a specific medicine, then attacking the constitution alone would be sufficient, as it is in the venereal disease (*Hunter's Works*, vol. i. p. 598.), and in another place he states, as some of the evil effects of mercury (vol. ii. p. 432.), the production of scrofulous enlargement of the glands, rheumatic pains in the limbs, or languid inflammations of the joints, having something of a scrofulous character, Cullen and Farre are decidedly opposed to its use. Cullen never found mercury in any shape of use in this disease, and that it is decidedly hurtful when any degree of feverishness had supervened. (*Pract. of Phys.* vol. ii. p. 272.) Dr. Thomson states that mercury has been used in every form of preparation, and in every variety of manner and dose. From the great apparent similarity of the symptoms, progress, and seats of scrofula to those of syphilis, and from the well-known effects of mercury in curing syphilis, it need not seem strange that medical men should have been a little obstinate in their attempts to obtain benefit from the use of mercury. These expectations are in general abandoned, and mercury is now given in the treatment of scrofula as a purgative only. A long-continued or improperly administered course of this medicine has often been known to aggravate all the symptoms of scrofula, and in many instances to excite them in persons in whom they did not previously exist. We have been particular in quoting these opinions, as they so entirely coincide with our own. We regard mercury in all its forms as a most injurious medicine in scrofula. Administered in small doses as an alterative, it frequently keeps up an irritation and excitement in the system which is eminently hurtful. As a purgative, independent of its specific effects, it is injurious, as belonging to the class of drastic medicines. (*On Inflammation*, p. 194.) Mr. Phillips, on the authority of Hufeland, Charmeil, &c. tried the black sulphuret; but at the same time that he states that he found no sufficient reason to induce him to employ it generally, he yet prefers it to the common mercurials in use, stating its chief excellence to consist in its not producing the usual effects of mercury, nor otherwise manifesting any decided anti-scrofulous virtue. (*Med. Gaz.* 1839, p. 814.) A variety

of other medicines have been resorted to in the cure of scrofula. The muriates of barytes and lime were some years since particularly recommended. Dr. Wood, the great advocate of the latter preparation, speaks of it as most valuable, safe, and effective. (*Edin. Med. and Surg. Journ.* vol. i. p. 147.) Other practitioners, however, have not found the same beneficial results, and it has gradually fallen into disuse. Lime-water, taken with milk to the extent of half an ounce three or four times a day, we have seen in many cases of most eminent service, especially so in those of long standing, where gland after gland becomes the seat of abscess and ulcer. The muriate of barytes was proposed in 1784 as a remedy by Dr. Adair Crawford. (*Med. Comment.* vol. xiv. p. 433., and vol. xvi. p. 225.) Mr. Phillips speaks well of this medicine, and says that, with the exception of iodine, none seems to exert a more decided influence over scrofula. It usually increases the appetite, the secretions, and sometimes, like some of the forms of iodine, produces diarrhœa.

The liquor potassæ, so much recommended by Brandish, is occasionally of benefit, but by no means produces those uniform results its admirers led one to anticipate.

The carbonate of soda conjoined with a very small quantity of rhubarb, taken two or three times a day, is a very serviceable remedy. Ammonia has likewise been recommended, but of its continued use in this disease we have not made sufficient observation to speak decidedly of its merits. Dr. Cumin, on the authority of Dr. Charles Armstrong, says the carbonate has been administered in scrofulous cases with excellent results; but that its stimulant and diaphoretic properties render it suitable only for cases in which there exist torpor, languid circulation, impaired appetite, and a dry husky state of the skin, such as we often meet with among the poor, and in that form of the disease so well characterised by Alibert (*Nosologie Naturelle*) under the designation of *scrofule momie.* (*Cyc. Pract. Med.* vol. iii. p. 718.)

The whole class of tonic medicines have, in their turn, been recommended. Some of them are exceedingly valuable. We have frequently seen the emaciated frames of those worn down by this disease rally most surprisingly under the use of small doses of quinine and conium. The exhibition of quinine, however, requires to be carefully watched, as in some constitutions it sets up an irritation in the alimentary canal, which is not easily subdued. We have found it produce uneasy griping pain, followed by small irritating evacuations. The wine of iron is another tonic, which is often of essential service. The carbonate we have generally observed to be too stimulating, and apt to derange the digestive organs. Arsenic has also been recommended, and a recent writer speaks especially of its power in allaying the pains of scrofulously inflamed bones and joints. The probability, however, of its setting up an irritation in the muco-digestive passages should induce us to employ more safe tonics, unless in cases where the skin is affected by some of the eruptions which are proper to this constitution. In these cases, it is very remarkable how effectually it alleviates the morbid condition of the integuments.

Of the use of the ammoniacal muriate of copper we have no experience; it was recommended formerly by Helvetius and Stisser, and enjoyed great reputation under the name of the Liquor of Kœchlin. It has now, comparatively speaking, fallen into disuse.

The employment of acids is, at times, absolutely called for. During the progress of the disease the tendency to perspiration becomes so extreme that, if not controlled by their exhibition, great debility ensues. Their use at other times, as alteratives and provocatives to a healthy state of the system, is attended by very marked advantages. At the same time their exhibition should be narrowly watched, as, in many constitutions, they tend to set up alvine irritation, and, in others, produce constriction of the chest.

Occasionally local pains render it necessary to resort to sedatives. They should not, however, be used unless absolutely required, as they tend to derange the biliary secretions, and otherwise to deteriorate the state of the system.

When employed, the least stimulating should be selected: as the belladonna, hyoscyamus, and the preparations of morphia. We prefer the hyoscyamus, as tending not to derange the bowels to the same degree as the others.

Of all the remedies, however, which have acted beneficially in this disease, none are to be compared with iodine and its compounds. This substance was first discovered in 1812 by Courtois, and was recommended by Coindet of Geneva as a remedy for bronchocele. It is a powerful medicine, but if used in proper quantities is safe, and exceedingly efficacious. It fell somewhat into disuse, however, on account of some obnoxious qualities attributed to it, until, in 1829, M. Lugol brought it again into notice by that judicious employment of it, which has almost identified his name with its administration. The chief objections that have been urged against this remedy are, that it produces absorption of some of the larger glands of the body, causes general emaciation, produces pulmonary tubercles and hæmoptysis, induces palpitations, restlessness, fever, and irritation in the mucous membrane of the fauces and stomach, and, if continued for sufficient time, general dropsy. That these effects are not produced when judiciously employed, sufficient trial has been made to enable one to state most decidedly. The error in the administation of iodine, before the memoir of M. Lugol informed the profession upon the question, consisted in form and in too large doses. Given as he has advised it, the results show no ground for the statement of its injuriousness, and so far from emaciation being a consequence, the immediate effect of its exhibition is often observed to be, that thin females have acquired a state of *embonpoint*, together with a feeling of increased strength and improved health. In order to insure its efficacy, it should not, previously to its being required for use, be mixed with a large quantity of water. For the sake of convenience it may be kept in a concentrated form, and mingled with its menstruum, *guttatim*, at the time required to be taken. Lugol has shown that its certainty is much insured by being mixed with the hydriodate of potassa. We have found it convenient to adopt the following formula*: — ℞. Iodini gr x, Potassæ Hydriodatis gr xx, Aquæ ℥ij. This makes an available and elegant preparation. From eight to twelve minims dropped into a glass of water, and taken three or four times a day, for an adult, has proved of the most signal service, and but rarely disagrees. There are certain states of the system which contra-indicate its use, the chief of which, in females, is a tendency to menorrhagia. It sometimes, in women of a lax weak fibre, produces this morbid state. Neither must it be employed when any erysipelatous state of the skin exists, nor when pneumonia, gastro-enteric affections, or diarrhœa, are present. Its ostensible and almost immediate effects upon the system are, an improved appetite, a more transparent and healthy colour of the skin, together with a general amelioration of the symptoms, followed by a decrease in, and eventually an absorption of, the morbid glandular swellings.

On the use of this medicine being persevered in a very long time, some patients suddenly become feverish, affected by headach, and loss of appetite, &c. On remitting its employment, these symptoms soon subside. An excess of this state, which has been termed by Coindet and others iodic saturation, is characterised by acceleration of the pulse, palpitations, dry and frequent cough night watchings, rapid thinning, loss of strength, trembling, &c. This condition of things should never be permitted to supervene. Baudelocque, whose employment of this remedy has been very extensive, affirms that he has never witnessed such a series of symptoms.

The statistical report of Baudelocque on the use of iodine is very satisfactory: of 67 cases of scrofula at the time of making his returns, 15 were cured, 14 were on the point of being declared well, 13 were in that state of

* The London Pharmacopœia directs that one ounce of iodine and two ounces of hydriodate of potassa should be dissolved in two pints of spirits, to form their tincture. We, however, prefer the aqueous solution.

progress which promised recovery, 5 had manifested some slight change for the better, and 20 were not benefited.

Very frequently, when it disagrees with the stomach, the hydriodate of potassa, administered by itself, or in conjunction with the decoction of sarsaparilla, is very useful. The other preparations of iodine taken internally are the iodurets of zinc and iron: these are both very beneficial. The iodide of iron is a most valuable preparation in cases of dilapidated constitution, especially when worn down by the effects of superficial ulcerations: occasionally, however, patients in this condition are not capable of bearing the iron from its overheating the system, producing constriction of the chest and unpleasant feelings of fulness; we have then found the iodide of zinc a convenient substitute: the dose of either may be stated to be from about three to five grains three times a day.

The ioduret of lead, in the form of an ointment applied externally either to simply swollen glands or to scrofulous abscesses or ulcerations, produces effects which are quite amazing when compared with the obstinacy of these conditions under other treatment. We have seen the most marked daily improvement follow its application in these cases, and may almost say have never been disappointed: it is bland, mild, and unirritating; for which reason it is to be preferred to the ointments made with iodine or with the proto-iodide of mercury, which produce, for some short time after application, sensations of heat, pricking, and burning. Baudelocque and Phillips, however, lay much stress upon the alternate use of these preparations, affirming that the tumefactions are only acted on by them for a short time after their first application. Our own observation has led us to conclude that the effect does not so speedily wear out.

Lugol is a strenuous advocate for applying iodine and its compounds in the form of baths. In this country we believe that this mode of application has not been much resorted to. We ourselves certainly have no experience of its employment in this form. Mr. Phillips does not approve of them, and states that in two cases where iodurated baths were prescribed by him, an extensive and troublesome eruption of the skin was produced, and in three others vertigo with a suffused countenance, which was not dissipated for some hours, while no sensibly good effects were produced upon the tumours. He does not state the strength of his baths, but the above effects call to mind the symptoms stated by Lugol as evidence in his experimental trials of the baths being too strong: and he particularly dwells upon the evils which result from employing iodurated baths prepared in stronger proportions than he has directed. The following tabular view of the proportions of iodine and hydriodate of potassa and water in baths for children and adults has been reduced from Lugol's formulæ to English measure by Dr. O'Shaughnessy.

Baths for Children.				Baths for Adults.			
Age.	Water.	Iodine.	Hydriodate of Potassa.	Degree.	Water.	Iodine.	Hydriodate of Potassa.
	Quarts.	Grs (Troy).	Grs (Troy).		Quarts.	Drms (Tr).	Drms (Tr).
4 to 7	36	30 to 36	60 to 72	1	200	2 to $2\frac{1}{2}$	4 to 5
7—11	75	48—60—72	96—120—144	2	240	2—$2\frac{1}{2}$—3	4—5—6
11—14	125	72—96	144—192	3	300	3—$3\frac{1}{2}$	6—7

The patients were generally immersed in these baths for the space of half or three quarters of an hour. The recommendation in their favour is fully borne out by the observations of Baudelocque, who in mentioning their remarkable effect on ulcerated surfaces, states, that on the individual coming from the bath, they appeared dried up, and as it were healed. In the course of the day, however, the surfaces again became moistened, and the secretion of pus which had been suspended reappeared, though in less quantity

BRONCHOCELE.

History.—Causes.—Cretinism.—Connection between bronchocele and cretinism—Diagnosis.—Treatment.

The term Bronchocele (from βρόγχος, the windpipe, and κήλη, a tumour) is applied to a morbid enlargement of the thyroid gland. This affection is endemic in every quarter of the world, particularly in mountainous districts. From its prevalence in some parts of Derbyshire, it is generally known in this country as the *Derbyshire Neck*. The Swiss call it *Goitre*, which is probably a corruption of *guttur*, throat. In most cases, the whole gland is uniformly affected with the disease, and forms a tumour in the front of the neck, often of an enormous size. Sometimes, however, the swelling is confined to the centre of the gland, or to either side.

At the commencement, the tumour has, in general, a firm elastic feel; but when it has existed a considerable time, it loses this character, and becomes soft and flabby, with hard knotty lumps distinguishable in its centre. Its growth is at first slow, but it afterwards advances rapidly in size, and extends in all directions, projecting beyond the boundaries of the chin and neck, and frequently becoming pendulous over the chest. Its appearance has often been compared to the dew-lap of the turkey-cock, and in many cases the resemblance is tolerably correct. In some instances the tumour is said to have reached the lower extremity of the sternum, and even to the knees. Dr. Broadbelt saw a case, where it was so large and flaccid, that the woman was in the habit of throwing it over her shoulder, to relieve herself from its distressing weight Sometimes three distinct tumours are observed, corresponding to the three divisions of the thyroid gland. At others, one lobe only is affected, and, according to Alibert, the right is more frequently attacked than the left. The skin over the tumour retains its natural appearance, but large varicose veins ramify in all directions beneath. The swelling is unaccompanied by pain, and, in general, causes but little inconvenience. Sometimes, however, distressing and even dangerous symptoms are induced by the pressure of the gland on the surrounding parts. In this manner, the circulation through the cervical vessels may be impeded; or respiration and deglutition rendered painful and difficult by the compression of the trachea and œsophagus. These complications do not apparently depend so much on the size of the tumour as on the mode of its growth, being wholly absent in many cases where the gland has obtained an enormous magnitude; whilst in others the patient is harassed by them, even from the commencement of the swelling. The obstruction of the circulation is sometimes so great, as to occasion congestion of the brain, and apoplexy. In some instances, also, the pressure on the trachea has been so complete, as to cause death by suffocation. De Haen found this tube nearly obliterated in a case of this kind. In milder cases the respiration becomes habitually wheezing, and the voice shrill or hoarse. Not unfrequently, the patients complain of palpitation on slight exertion.

When goitrous tumours are examined internally, the following appearances are observed. The diseased gland is surrounded by a supernatural quantity of cellular membrane, thickened and condensed, which in some instances is so abundant, that it forms the chief bulk of the tumour. The gland itself is hypertrophied either uniformly or partially. Most commonly its whole substance is simultaneously affected; but sometimes one of the lobes is enlarged, while the rest of the gland remains free from disease. When cut into, the diseased gland exhibits a cellular appearance. These cells are very various in size in the same gland: they are sometimes no larger than a pea; whilst at others they form considerable cavities, which seem to be produced by the di-

latation of the cells which enter into the natural structure of the gland. They contain morbid matter of various kinds, either fluid or solid. Sometimes, it is perfectly aqueous, or more or less viscid and adhesive; sometimes, it has a gelatinous consistence; at others, these depositions have a fatty, fibrous, cartilaginous, and, in some cases, even a bony character.

Causes. Numerous theories respecting the origin of bronchocele have at different times been advanced, which have fallen to the ground under the test of more extended experience. It has frequently happened that some accidental circumstance in its local history has been made the basis of doctrines respecting its origin which have been found inapplicable on a more general view of the disease.

With regard to its *predisposing causes*, there can be no question that women are far more liable to it than men: indeed, it rarely occurs in the latter sex in this country; and even in localities where it is more particularly endemic, it is almost exclusively confined to females, except when connected with cretinism, to be presently noticed. It generally commences in infancy, between the ages of eight and twelve, and sometimes much earlier. In some instances it is said to be congenital. It frequently begins at the approach of puberty, the thyroid and mammary glands enlarging simultaneously and in some localities almost as certainly. A moderate fulness of the thyroid gland is by no means uncommon at that period in girls of this country, often exciting apprehension, but generally subsiding after a few months. The development of the disease is often preceded or accompanied by uterine disturbance. (Copland's *Dict. of Pract. Med.* art. BRONCHOCELE.)

Women of the leucophlegmatic temperament seem to be more liable to it than others. It is a popular notion in some countries that the disease predominates in those who have long necks; and girls of this conformation have, in consequence of this opinion, a difficulty in forming a matrimonial engagement.

The scrofulous diathesis has been considered by some to give a predisposition to bronchocele, which, however, is deficient in some of the essential characters of struma. The swelling is rarely preceded or accompanied by constitutional disturbance. There is little tendency to ulceration, the tumour continuing for many years in an indolent and inactive state. The lymphatic glands do not in general partake of the disease.

There seems more ground for the opinion of an hereditary predisposition to this disease. Certain families are observed, in districts where it is endemic, to be goitrous through successive generations. Dr. Crawford knew "a woman with goitre, whose grandmother, father, paternal aunt, and cousins also had it, although they did not all live in the same place, and no other person in their neighbourhood was affected with the disease." (*Cyc. Pract. Med.*) Similar facts have been mentioned by Fodéré and others. Indeed, in Switzerland, this tendency of the disease is a matter of common observation.

Great obscurity attends every step of the inquiry into the nature of the *exciting causes* of bronchocele, or the influences which occasion its appearance in certain localities as an endemic disease. This investigation may eventually lead to the discovery of important principles respecting the action of moral and physical conditions upon the growth and development of organised beings. At present, however, our knowledge on this point is too limited and uncertain to permit any safe or legitimate conclusions. In general terms it may be said that bronchocele fixes its abode in the deep, dark, and humid valleys of mountainous regions, which are filled with malarious exhalations, and where the atmosphere is seldom ruffled by a breeze of sufficient power to remove the accumulated poison. In Europe, it is a prevailing affection in the valleys of the Pyrenees, the Tyrol, and the Alps; and it is also met with among the mountain ranges of other parts of the world: generally speaking, too, the disease predominates in those localities where the agencies alluded to are in greatest abundance. In Switzerland, it is most common in the Vallais, which of all the Alpine districts is the closest and worst ventilated. "Were

this valley (says Dr. J. Johnson) beneath a tropical sun, it would be the seat of pestilence and death. As it is, the air must necessarily be bad; for the high ridges of mountains, which rise like walls on the north and south sides, present a free ventilation; while, in summer, a powerful sun beats down into the valley, rendering it a focus of heat, and extricating from vegetation and humidity a prodigious quantity of malaria."

It has been remarked by observers in goitrous districts in different parts of the world, that the disease disappears at a certain height above the level of the sea. Saussure found in his travels through Switzerland, that in a valley watered by the same stream, and where the habits and occupations of the inhabitants were precisely similar, those who lived in the upper portion of the valley were never attacked with the disease, which was endemic in the lower portion. He states, also, that goitrous patients, who removed from the latter to the former of these localities, were gradually disburdened of their complaint; while, on the contrary, it frequently attacked those who left the upper to reside in the lower parts of the valley. The investigations of Fodéré, and others, have led them to the same conclusion.

But, on the other hand, Bronchocele is sometimes endemic in places of considerable elevation. Humboldt (Magendie, *Journ. de Physiol.* t. tii. p. 116.) found it in Bagota, in South America, 6000 feet above the level of the sea. Mr. Bramley met with it among the Himalaya mountains at the height of 5000 feet; and upon the summit of a high mountain, forty-eight persons out of fifty-three were goitrous. (*Brit. and For. Med. Rev.* 1839.) Ramond, quoted by Dr. Crawford (*Cyc. of Pract. Med.*), observed both goitre and cretinism in the "open, well-watered, and well-ventilated valleys of the Pyrenees."

In some places, also, where all the ingredients for the production of malaria are present, bronchocele is unknown. It has often been observed to be less prevalent at the foot of a valley, where the miasmata must be supposed to be most concentrated, than its more open and elevated portions. Bronchocele, moreover, is not generally attended by any of the ordinary symptoms which are supposed to denote the action of malaria; on the contrary, goitrous persons are frequently robust and healthy. It may be doubted, therefore, whether this affection can be attributed to malaria in the ordinary acceptation of the term; that is, to the poison which induces remittent and intermittent diseases. At the same time it seems obviously dependent upon some deleterious quality of the atmosphere in places where it is endemic, not only attacking natives of those districts, but visiters who remain there for even a short time, although the greatest caution is observed in avoiding improper diet and other reputed sources of the disease: while by a removal from these localities, goitrous swellings often disappear spontaneously.

Dr. Good supposed that bronchocele is the consequence of a diet deficient in nutriment, and attributed its prevalence in Derbyshire to the quantity of oaten cake employed there as an article of food. It is a common opinion in Switzerland that those who eat large quantities of chesnuts are very liable to the complaint. The wretched condition of the poor in the Vallais may, however, probably contribute to its prevalence there.

Goitre attacks indifferently the rich and the poor. We know an instance of an English lady in affluent circumstances, who became affected with it after a residence of a few months in a goitrous district in Switzerland; and many similar cases might be mentioned to prove, that the utmost care in the selection of diet does not remove the liability to the disease. Indeed, the rareness of its occurrence in the crowded parts of London is sufficient to prove, that misery, filth, and destitution, are not alone sufficient for its production.

The frequency of goitre in Alpine regions has given rise to the opinion (noticed by all authors on the subject since the time of Pliny) that it is caused by drinking the water from the glaciers or melted snow. Dr. Friend says, "The liquor, in going down, must needs chill the muscles of the throat, *i. e.* it contracts the vessels, and thickens the humours which circulate through them,

at the same time, from whence must flow a stagnation or obstruction, and, after a while, a swelling in those parts." (*Hist. of Phys.* vol. ii. p. 146.)

It is now, however, well ascertained that the disease is endemic in warm latitudes where snow never falls, as China, India, Sumatra; while in Lapland, Greenland, and some other northern regions, where melted snow is the common drink of the inhabitants, bronchocele is never seen.

It is curious that the converse of this opinion respecting the origin of goitre has been maintained by some modern observers. Fodéré remarked that it is less prevalent in the neighbourhood of glaciers which supply the villages with water, than in other parts of a goitrous valley. (*Traité sur le Goître et le Crétinisme.*) Captain Franklin states that at Edmonstone on the Saskatchanan river, where goitre is endemic, those persons who drink snow water entirely escape the disease; but those who use the river water are almost universally attacked. (*Journ. of Voy. to the Polar Seas.*) These facts seem to favour the notion, which is a popular one in goitrous districts, that bronchocele originates in some deleterious quality of the water; indeed, it is impossible to examine the filthy beverage of some of these districts, without being convinced that pernicious consequences must ensue from its habitual use. Bally (*Dict. des Scien. Méd.*), a native of a district in Switzerland, where bronchocele is endemic, states that, in his country, those who drink the waters of certain fountains are almost always attacked, whilst others of the same village who avoid these waters are not liable to the complaint. Rombateau, also, considers that water impregnated with calcareous salts contributes to its development. Dr. Coindet observed that almost every individual of a regiment who drank the calcareous water of the pumps at Geneva were attacked with goitre, which disappeared rapidly upon their removal to other quarters. Its prevalence in Nottingham is ascribed by Dr. Manson to the same cause. (*On the Effects of Iodine.*)

Mr. M'Clelland has lately made extensive researches into the causes of bronchocele among the Himalaya mountains. His inquiries extended over 1000 square miles, and he invariably found limestone rocks in the immediate neighbourhood of goitrous districts, while in villages where this stratification was not observed, the disease was rarely met with. When it was found in the latter places, Mr. M'Clelland could generally trace it to the use of water having its source in the limestone rocks, and where these waters were avoided, the complaint seldom appeared. Unfortunately, however, there are facts which prevent the universal application of this theory respecting the origin of the disease. 1. Bronchocele is met with abundantly in districts where there are no limestone rocks, as, for instance, in the Vallais. 2. It is absent in many places abounding in limestone formations. 3. It prevails in districts where the water is pure, and free from calcareous impregnations. (Humboldt, *op. cit.*) 4. A strict adherence to distilled water is not sufficient to ward off the disease in affected places.

The only way of reconciling these conflicting statements is, by supposing that the habitual drinking of calcareous waters strongly predisposes to bronchocele, and that there are other causes which have the same tendency, although few, to an equal degree. But that the presence of some additional influence hitherto unknown, and probably of a more subtle and hidden nature, seems necessary for the development of the disease.

Cretinism, to which we have before alluded, forms a most remarkable and interesting part of the history of bronchocele. The cretin — the most disgusting and hideous of beings possessing the human form — is found accompanying bronchocele in the Alps, the Pyrenees, the Himalaya mountains, and wherever the disease is abundantly endemic.

His stature is diminutive, seldom exceeding from four to five feet; the head is large, and the skull excessively thick; the countenance is vacant and void of intelligence, having in youth the aspect of old age; the eyes project and are widely separated; the eyelids are coarse and prominent; the nose wide and flattened; the tongue large and protruding, causing thick and babbling

speech; the lips are thick, and the mouth large and drivelling; the skin is loose, wrinkled, and of a dirty brown colour: the muscles are soft and flabby; the abdomen large and pendulous; the legs short and curved, occasioning the gait to be awkward and waddling; and a goitrous tumour occupies the neck.

This wretched deformity of body is, in general, accompanied by a corresponding infirmity of mind. Idiotism of the very lowest grade is often the lot of the cretin. Sometimes even the external senses are absent; and the cretin is deaf, dumb, and blind, with complete insensibility even to the demands of nature; more frequently, however, he is wholly governed by the animal propensities, being mischievous and lascivious, yet indolent and sluggish to an extreme degree. In some instances, however, he possesses a certain degree of intelligence scarcely inferior to that of the community among whom he dwells. A cretin of this class joined the writer and his party in the ascent of the Great St. Bernard. He was quiet and respectful, and answered questions coherently, so far as his imperfect articulation could be understood.

The connection between bronchocele and cretinism is a subject well deserving attention, but on which our space will not allow more than a brief summary. 1. Cretinism is confined to districts where goitre is endemic. 2. Wherever cretinism prevails bronchocele is invariably found, but the latter is prevalent in districts where the former is never seen. 3. These affections seem to result from the same cause, but cretinism is not produced except in localities where the poison, on which they both depend, exists in the greatest activity. It is never seen, for instance, in the goitrous districts of this country, or in several of the more open goitrous valleys of Switzerland. It is comparatively rare in the better-ventilated parts of the Vallais; whilst in the gloomy valley of the Rhone it is so common as to give a character to the district. In accordance with the same rule, it has been observed that bronchocele and cretinism occur together in the deepest parts of a goitrous valley, but that the traces of the latter are lost beyond a certain altitude, where bronchocele continues endemic. 4. It has been supposed, when a family has been goitrous for two generations, that cretinism will appear in the third. It is also said, that when both parents are goitrous, their offspring will be cretins. But although these assertions may not be literally true, they convey the general impression of the inhabitants of affected districts as to the importance of intermarriage in removing the taint of cretinism; and the researches of M. Rambeteau tend to confirm the correctness of these views. He ascertained that those inhabitants of the Vallais who take their wives from places where neither cretinism or bronchocele are endemic, have cretinous children far less frequently than those who marry females of their own valley, or other goitrous districts.

Diagnosis. Although the tumour of bronchocele is in general sufficiently characteristic, it may sometimes be confounded with other affections. The thyroid gland is liable to inflammation; but this disease may be distinguished from goitre, by the hard unyielding character of the swelling, by its being accompanied with redness of surface, increased heat and pain on pressure, by the suddenness of its appearance, by its not attaining the size of a goitrous tumour, and by its tendency to suppurate. The gland is sometimes affected with scirrhus. In this case, however, only a small portion is usually affected, which differs from bronchocele in its extreme hardness, and in being generally the seat of severe lancinating pain. In scirrhus, also, the swelling seldom attains a large size. Encysted tumours sometimes form in the course of the trachea, which may be distinguished from bronchocele by their situation, by their compact form, and by their giving a sense of fluctuation. Aneurism of the thyroid arteries may be known from goitre by the pulsation which accompanies the former affection, by the situation of the swelling, and by its diminishing or disappearing under firm pressure.

Treatment. The introduction of iodine as a therapeutic agent has nearly superseded all other remedies for bronchocele. This substance formed the active ingredient of several combinations that had previously obtained a reputation for

the cure of this disease. The most remarkable of these was the burnt sponge, which has been successfully administered in many cases. It was principally used in the form of lozenge, and suffered to dissolve slowly and gradually in the mouth, a method supposed necessary to insure its good effects. The ashes of the fucus vesiculosus, called by Russell the vegetable æthiops, an empirical remedy named le poudre de Sensy, and some others, formerly favourite remedies for goitre, have also been found to contain a portion of iodine.

About six years after the discovery of iodine by Courtois, its presence was detected in burnt sponge by Dr. Straub of Berne. About the same time Dr. Coindet of Geneva, observing the similarity between burnt sponge and the ashes of the fucus vesiculosus, which was known to yield iodine, conceived that this substance might form the active principle of these medicines, and the idea occurred to both these gentlemen that iodine would prove an important remedy in the treatment of bronchocele. These views were immediately put into practical operation by Dr. Coindet with the most complete and gratifying success, for of 100 patients to whom the medicine was given two thirds were cured. Since that period iodine has been extensively employed wherever bronchocele prevails, and its utility in this affection may be considered as fully and satisfactorily established. The formula employed by Coindet consisted of 40 grs. of iodine to an ounce of alcohol, of which from 10 to 20 drops were a dose. He also recommends an ointment composed of half a drachm of the hydriodate of potash to an ounce and a half of lard, of which a drachm is to be rubbed over the tumour night and morning. Dr. Marson of Nottingham cured 79, and greatly relieved 12, out of 120 cases. His preparation consists of 24 grs. of the hydriodate of potash dissolved in an ounce of distilled water, to be given in doses of 5 drops three times a day. Dr. Elliotson recommends a drachm of the iodine of potash to an ounce of distilled water, the dose at the commencement to be from 10 to 15 minims, and gradually increased. Dr. Copland has found this remedy most efficacious in small and soluble doses, and has succeeded in curing some cases by his method, upon which large quantities of the remedy had made no impression.

As to the question whether this medicine is best employed internally or externally, it may be remarked that both methods may often be advantageously combined. Some patients, however, cannot bear even the smallest dose of the medicine taken into the stomach, who feel no inconvenience from its topical application. In either case, however, its effects should be carefully watched, and its exhibition suspended for a period, or its dose lowered, upon the manifestation of poisonous symptoms. Little benefit, however, may be expected from this or any other remedy unless regard be paid to other circumstances connected with the treatment. Whenever it is practicable, the patient should be removed from the goitrous district into some open and elevated situation. Numerous instances are recorded where the adoption of this change was followed by a rapid subsidence of the disease. Where the patient is plethoric, the exhibition of iodine may be properly premised by general bleeding. The application of leeches to the swelling is often useful to diminish any inordinate irritation — an accident which not uncommonly occurs during the exhibition of iodine, — and they may also assist in the reduction of the swelling.

If there should be symptoms denoting derangement of the digestive organs, a course of alterative medicine should be commenced and persevered with until their healthy action is restored.

When the uterine functions are unduly performed, which is often the case in bronchocele, emmenagogue remedies should be prescribed.

Other remedies were formerly used in the treatment of goitre, which are now seldom employed: of these the principal are digitalis, belladonna, conium, muriate of barytes, muriate of lime, calcined egg-shells, sulphuret of potash, mercurial preparations, &c. As external applications, it was the practice to employ repeated blisters, stimulating plaisters of ammoniacum and mercury, or cicuta and ammoniacum, stimulating or opiate liniments, caustic applications, &c.

When the tumour of bronchocele occasions great inconvenience by its pressure on the trachea or œsophagus, and the ordinary means of relief have failed, a cure has been attempted by means of a surgical operation. (See Cooper's *Surg. Dict.* art. BRONCHOCELE.)

Several cases are recorded where the tumour was reduced by the introduction of setons into the diseased gland. This method appears to have been practised in the middle of the last century, but was not generally known until Dr. Quadre of Naples published some cases in which it had been employed with success. It was afterwards adopted with benefit by Mr. Copland, Hutchinson, and others. The objections to its use are, that it is sometimes attended with dangerous hæmorrhage, or by extensive suppuration of the gland. There is also danger of the communication of the inflammation to the trachea and larynx.

In some instances the operation of tying the thyroid arteries has been practised. It was first attempted by Sir W. Blizard, with the effect of reducing the size of the tumour one third. The ligatures subsequently sloughed off, considerable hæmorrhage ensued, and the patient finally sunk from hospital gangrene. In 1814 this experiment was repeated by Walther of Landshut. He first placed a ligature on the left superior thyroid artery, which in a short time occasioned a diminution of the gland on that side to one third its original size. He then tied the artery on the opposite side, which was followed by wasting of the tumour on the corresponding side, but not to the same extent as in the previous operation. The patient, who had suffered from dyspnœa in consequence of obstruction of the windpipe, was greatly relieved, and continued well two years after the operation. Mr. Coates of Salisbury also tied the left superior thyroid artery in bronchocele with urgent symptoms. The swelling diminished to nearly one half its former dimensions, and the patient left the hospital in good health. In the subsequent history of this case, however, communicated by Mr. Coates to Dr. Crawford (*Cyc. Pract. Med.*), it appears that, after continuing well for some time subsequent to her discharge from the hospital, the tumour gradually returned, and at length occasioned death by suffocation. A case very similar to that of Mr. Coates is given by Dr. Crawford from the notes of Mr. Wickham of Winchester. The tumour was diminished by the operation; but after six weeks it began to return, and shortly regained its former size. "It seemed (says Mr. Wickham) that the decrease of the tumour continued so long as the part of the gland, which had been supplied by the vessel, remained without nourishment, but as soon as the supply was restored by the anastomosing branches from the opposite superior thyroideal arteries, the swelling returned to its former dimensions."

Some surgeons have effected the complete extirpation of the gland. Desault is said to have removed a portion of it successfully, but from the description of his case, it appears to have been more allied to scirrhus than to bronchocele. Mr. Gooch (*Med. and Chir. Obs.*) attempted the excision of the gland in two instances. In the first, the hæmorrhage was so alarming that he was obliged to relinquish the operation, and the patient sunk from exhaustion. In the other case, the bleeding was also excessive, and could only be arrested by the pressure of the hand on the part, which was kept up by a succession of persons for a whole week. Dupuytren completed this operation, and although the patient only lost a small quantity of blood, death ensued in thirty hours.

The operation has sometimes, however, been followed by happier results. Dr. Hedenus of Dresden has performed it six times with success, and a few other similar instances might be mentioned. But it is always attended with great hazard, and is hardly justifiable, except where the patient is threatened with immediate destruction from the pressure of the tumour.

RHEUMATISM

Forms.—Acute rheumatism.—Complications.—Rheumatic inflammation of the heart.—Rheumatic pleurisy.—Arachnitis.—Diagnosis.—Pathology.—Causes.—Treatment of acute rheumatism.—Chronic rheumatism—Description and treatment.—Muscular rheumatism.—Lumbago.—Pleurodynia.—Rheumatism of the muscles of the neck—Of the muscles of the limbs—Of the abdominal muscles.—Treatment of muscular rheumatism.

THE word *Rheumatism*, like its kindred term *gout*, is the offspring of the humoral school of pathology. Its literal signification is "fluxion," and it is primitively derived from the Greek word "ῥέω," to flow; "ῥεῦμα," a fluxion.

Rheumatism has always deservedly engaged the attention of English physicians, on account of its great frequency in our climate, its painful and protracted course, and the baneful evils which often follow in its train. Of late years, additional interest has been attached to its study, by the discovery that, in the acute form, it often fixes on the fibro-serous textures of the heart, and causes changes in their structure which interfere with the functions of that vital organ. Many have laid claim to the merit of this discovery, and M. Bouillaud, in particular, has been loud in his pretensions; but it appears that Dr. Pitcairn first noticed this fact, and pointed it out to his pupils at St. Bartholomew's, as early as 1788. In November, 1808, Sir D. Dundas read a paper on the subject before the Medico-Chirurgical Society.

In that paper rheumatism of the heart was considered in its true character, and described as occurring, not by metastasis, but at various periods in the course of the malady. By reference to morbid anatomy, Sir D. Dundas showed that the internal membrane of the heart was liable to be affected, as well as the pericardium. Subsequently, Dr. Wells and Dr. Odier of Geneva made some important observations on this subject. It is, then, certain, that the true connection between disease of the heart and acute rheumatism was observed long ago by British physicians, and that they did as much for its history as could be expected without the help of auscultation. The extreme frequency of rheumatism of the heart was not known to them, because their diagnosis of it was imperfect. Since Laennec's discoveries British physicians have continued to improve their knowledge of this affection: its great frequency has been recognised, and its seat and morbid effects well ascertained.

Rheumatism affects two forms, the *acute* and the *chronic*.

Acute rheumatism. Persons from fifteen to thirty years of age are the most subject to acute rheumatism: in old persons and in children it is comparatively rare: the latter are not, however, so generally exempt from this disease as they are from gout, for instances of acute rheumatism in children are by no means uncommon. The first symptom of the malady is, in the great majority of cases, severe pain of the insteps and ankles, which is sometimes, but not always, attended with shivering. When the attack is sudden, as generally happens, the affected parts become, in the course of a few hours, uniformly swollen, tense, and elastic, and soon afterwards the integument is suffused with a bright rose-coloured blush, mostly in patches, the neighbouring cutaneous veins being at the same time turgid. The tense and elastic condition of the parts soon gives place to a flaccid and puffy state, and while this change takes place the pain abates. The knees are attacked soon after the ankles; the affected limbs are immediately and completely disabled, so that in many cases the patient is obliged to be helped to his bed soon after the accession of the first symptoms: the slightest motion of the rheumatic limbs occasions excruciating pain. The upper extremities become next affected, and the patient is thereby rendered incapable of movement; a circumstance which causes

a peculiar and characteristic posture. Fever comes on with or soon after the local symptoms, and increases with them; it is attended with profuse sweating when the pain is severe, and this sweating, far from giving relief, is more profuse as the pain increases. The pain is in most cases aggravated by warmth, and usually much more severe at night than by day: the fever, too, is much greater at night, when the patient's linen is often drenched with perspiration which has a sour and pungent odour. During the day there is also considerable fever; the face is flushed; the pulse, which is seldom less than 90 and sometimes reaches 120, is hard and full: there is loss of appetite; urgent thirst; and the urine, scanty and high coloured, deposits, on cooling, an abundant brick-coloured sediment. The patient remains in this state until nearly all the joints of the extremities have become affected in their fibrous textures; tendons and sheaths of muscles likewise suffer, and effusion takes place into the cellular tissue and synovial capsules in contiguity with these several structures. The affection of each part does not usually continue during the whole course of the disease; after a certain period it subsides, but generally returns at least once. The number of parts affected at the same time is considerable, and, with few exceptions, much greater than in gout.

About the end of the first fortnight there is generally some amendment: the pain lessens, especially at night; and there is corresponding abatement of fever, and diminution of perspiration. At the same time the urine becomes more abundant, and less charged with deposit; appetite returns, and thirst diminishes, while the pulse falls to nearly its natural standard; the movements also are more free, and the patient varies his posture. The course of this amendment is however often interrupted by exacerbations, and convalescence is not in general confirmed until the middle or end of the fourth week. In some rare instances, convalescence appears as early as the second week, but is more frequently deferred to the sixth week, or a still later period. In an average, drawn from a considerable number of cases, we found the duration nearly one fourth greater in first than in subsequent attacks. We have stated that, at the height of the malady, effusion takes place from the affected parts. The appearances differ according as the fluid is effused into cellular tissue or into the definite cavities of synovial capsules: in the former case the part is puffy, and, in some rare instances, œdematous, as on the wrists and insteps; in the latter, fluctuation may be perceived with tense swelling, in form of the capsule, tendinous sheath, or bursa.

The characters last mentioned are most obvious in the knees, because effusion into the capsules of those joints is either conspicuous, or at any rate easy of detection. As effusion proceeds the pain abates, unless the quantity of fluid poured out be sufficient to occasion much distension.

It has been stated that each part does not continue to be affected in this way through the whole course of the disease, but that the individual affection subsides, and generally returns at least once. Each of these attacks of a given part occupies a period varying from three to fourteen days. The circumstance that effusions into synovial capsules are more general in some cases than in others, has led many to suppose an essential difference between such cases, which have accordingly been distinguished by the epithets *fibrous* and *synovial*: it has even been alleged that the heart, if not entirely safe, is much less liable to be affected in synovial rheumatism; and further, that these two forms require entirely different treatment. We are of opinion that they are identical in nature; that the fibrous tissue is primarily affected in both, whether the consecutive effusion take place into cellular tissue or into a synovial capsule: and in almost all those cases, called *fibrous* rheumatism by authors, we can from observation affirm that effusion does take place into the capsules of the knees at least. We have elsewhere shown that the heart is equally liable to be affected in both cases.

On the approach of convalescence, when recovery is to be complete, the fluid effused in different parts is rapidly absorbed, and the joints regain their natu-

ral form and usual freedom of motion. They continue weak, however, for some time, and are occasionally painful at night. In less favourable cases the fluid effused in the synovial capsules does not become absorbed, and the ligaments continue in a thickened state; the functions of the joints are thereby much impaired, and disposed to be still further altered by chronic rheumatism, which is the common sequel. Effusions become permanent in the small joints of the hands and feet, oftener than in any others; the synovial sheaths of the tendons of the fingers are also very liable to the same condition, and their course is then marked out by ridges on the palm and back of the hand.

Such are the course and characters of acute rheumatism when affecting external parts; but in a large proportion of cases there comes on at some period of the disease another group of symptoms. These are, chiefly, sudden pain in the præcordial region, and palpitation, attended with difficulty of breathing and sense of oppression. The appearance of these symptoms indicates, pretty surely, that the heart has become affected with rheumatic inflammation; whether the internal membrane or the pericardium be its seat, can be determined only by auscultation and careful examination of the chest, for the general symptoms are alike in both cases. The præcordial pain sometimes extends to the left hypochondrium, is generally increased by pressure in the intercostal spaces, by inspiration, and by lying on the left side. The difficulty of breathing is often considerable, and there is usually a slight increase in the frequency of the pulse, which, with rare exceptions, maintains its regularity.

These symptoms usually lose much of their severity in the course of the twenty-four hours which follow their accession; the dyspnœa and oppression are alleviated; the palpitation and pain remit, and subsequently occur only when the patient coughs, or, if at other times, for very short intervals. After this period there is seldom anything very alarming in the general symptoms; often, the patient is tranquil, and unembarrassed in manner, and nowise suspects that he is affected with disease of a vital organ. This freedom from suffering is observed even when there is considerable effusion into the pericardium, and sufficiently explains the fact, that rheumatic inflammation of the heart so long escaped the notice of physicians.

The symptoms above described are sometimes so slight, even at their onset, that they are not complained of, and it is only by inquiry that their occurrence is ascertained. In some cases (of pericarditis especially), the only indication that rheumatism has become extended to the heart is a singularity of manner and waywardness, which are characteristic, and easily recognised by those who have once witnessed them. Taciturnity and a look of listlessness are often the most striking characters of this state of mind, which is not one of active delirium. If the patient be narrowly watched it will be generally found, also, that the breathing is much quicker than natural, for difficulty of breathing is one of the most constant of the symptoms of rheumatism of the heart. Indeed, the breathing appears to be more affected than the pulse in these cases, as regards frequency at least.

Although acute rheumatism of the heart often lays the foundation of future irreparable mischief, it is not often immediately fatal; the instances of death occurring in the acute stage being chiefly in persons of weak or broken constitution.

If the chest be carefully examined some hours after the onset of the affection, various important circumstances are observed. Abnormal sounds attend the heart's action, and these vary in character according as the seat of rheumatic inflammation is in the pericardium, or in the lining membrane of the heart.

In the latter case the morbid sound is some modification of "bruit de rape," or of bellows-sound, and attends the heart's systole or diastole, or both. In twenty-three cases of rheumatic endocarditis which were observed with much attention, the different conditions of this sound as regards time and situation were carefully noted, and the following circumstances remarked:—In all but three, this sound was loudest at that point of the præcordia where the heart's

impulse was felt, and was also much louder in the left præcordial region than in the right, where often the sounds of the heart were quite natural. The sound attended the diastole in one case only; in all the others, the systolic sound was exclusively altered. At the point of impulse, however, the diastolic sound was quite inaudible, and seemed to be involved in a prolongation of the systolic. From these facts, we must infer that the morbid sound originated principally, and often exclusively in the left cavities of the heart, and was most probably produced by a morbid condition of the aortic valves. The first inference accords well with what we know of the pathology of the valvular apparatus of the left side of the heart, which, from being more tendinous in structure than that of the right side, is more subject than the latter to rheumatic inflammation. It is easy to show why, under common circumstances, a morbid sound, proceeding from the aortic valves, should be louder at the point of impulse than elsewhere; for, since the systole and impulse are exactly synchronous, the point of the left ventricle is thrown into firm contact with the walls of the chest at the very moment the sound is produced; thus establishing, between the origin of the sound and the ear of the observer, a more direct and more *uniform* medium of communication than can be found at any other point of the præcordia. At that point, also, there is in many cases a palpable vibration (*frémissement cataire*), which sometimes indicates the character of the sound in a most remarkable manner.

We have stated that this morbid sound affected the diastole in one case only of the twenty-three referred to; this fact admits of the following explanation. At the moment of diastole the heart has ceased to be in firm contact with the walls of the chest, so that the condition, which is so favourable to the transmission of systolic sounds, no longer exists; to this circumstance, and to the greater remoteness of the mitral valve from the surface, must be ascribed the rare occurrence of abnormal diastolic sounds in acute rheumatism. The mitral valve is, without doubt, quite as often affected with rheumatic inflammation as the aortic valves, for it is more tendinous in structure, and in the aggregate of valvular diseases is oftener affected. The plain inference from these facts is, that it is possible for rheumatic inflammation of the lining membrane to exist, without altering the sounds of the heart at all; and it would therefore be prudent, when marked general symptoms of the affection appear, to adopt the same remedial measures as if no doubt of its reality existed. We have never known the morbid sound in question entirely cease after it had once come on, but in most cases a change in its character takes place as febrile excitement subsides, and convalescence approaches; at first generally harsh, and sometimes a true "bruit de rape," it gradually loses this quality of harshness, and acquires the pure bellows-tone, while at the same time it diminishes in loudness; thus illustrating Laennec's remark, that these are merely modifications of the same sound. These changes are mainly owing to diminished rapidity of the circulation, for when that function becomes temporarily accelerated by exercise, the former character of the sound in great measure returns. It is in those cases, in which the quality of the sound is very harsh, that a palpable vibration is remarked.

These are the circumstances observed in a careful examination of the chest, in the common course of rheumatic inflammation of the valvular apparatus of the heart. We have dwelt at some length on the subject of the morbid sound, because some writers of authority, and especially M. Chomel, have lately endeavoured to depreciate its value as a sign of the affection under consideration; but the circumstances, detailed in connection with this sound, leave no doubt of its real value as a symptom.

When the pericardium has become the seat of rheumatic inflammation, the local signs, observed in auscultation and examination of the chest, differ in character from those just described, and denote the effusion of lymph and serum from the inflamed membrane. The principal of these signs are, dulness on percussion in the præcordial region; prominence of that region, so that the

intercostal furrows are effaced; and a rubbing sound attending the heart's action — or, when the effusion is very abundant, diminished clearness of the heart's natural sounds, which seem remote and stifled.* We have never seen an example of rheumatic pericarditis in which the rubbing sound was wanting, but have known many of idiopathic pericarditis in which it was not observed: we have reason therefore for believing, that it is more frequent in the rheumatic than in the idiopathic form of pericarditis; a circumstance which indicates some difference in the quality or quantity of the effused fluid in the two varieties. The fluid seems to be, generally speaking, less abundant in rheumatic than in common pericarditis, the increased dulness on percussion being, as far as we have observed, less extensive. These circumstances give additional value to the rubbing sound as a sign of rheumatic pericarditis. The period during which the physical signs continue, varies much in different cases, and depends on the rapidity with which the affection proceeds towards a favourable or fatal termination. In one case which fell under our notice the rubbing sound continued during two days only, and was almost the only physical sign of the affection, for the fluid effused was not in sufficient quantity to occasion extensive dulness, or alter the form of the præcordial region. The general symptoms of the affection had already subsided before the sound ceased, so that its cessation undoubtedly marked the completion of cure by adhesion. In most cases, however, this sound lasts from a week to a fortnight, but as the curative process advances gradually becomes less loud and more limited, and at length ceases altogether; an event which probably denotes adhesion between the surfaces of the pericardium. While this change is taking place the extent of dulness on percussion diminishes, and the natural form of the præcordia is in great measure restored. But the general symptoms of the affection have usually subsided long before these physical signs disappear, so that patients are often at a loss to know why the physician continues to examine the region of the heart with so much attention. Cases do occur, however, in which rheumatic pericarditis terminates fatally, and in these the symptoms have exactly the same progress and character as in fatal pericarditis from other causes.

The physical signs mentioned as characteristic of pericarditis are never observed in simple endocarditis, but in all the cases of rheumatic pericarditis which we have seen, endocarditis was also present, and was distinguished by its usual physical signs. In some cases these existed before pericarditis came on; in all, they continued after the proper signs of that affection had ceased. In some, the "bruit de rape," which had come on first, and which characterised the deeper affection, could be heard, as it were, through the rubbing sound of the pericardium: from this it appears that rheumatic inflammation of the pericardium is less frequent than that of the valves of the heart. In twenty-one cases of acute rheumatism affecting the heart, which were taken indiscriminately, and whose history was written with exactness, there were five only of pericarditis, and in all these the lining membrane was also affected. We shall presently show that the remote effects of the deeper affection are also much more serious than those of pericarditis.

Pleurisy very often complicates rheumatic pericarditis: it existed in three of the five cases just referred to; and since the period at which these five were observed we have seen five other instances of the same complication. In all these, the pleurisy was on the left side (double in one case); and where the order of succession of these affections was observed, pericarditis had the priority. These are the only examples we have seen of pleurisy occurring in the course of acute rheumatism. We infer, from the circumstances mentioned, that in those cases the pleurisy was not of rheumatic origin, but a simple inflammation, excited by the pericarditis which previously existed. This inference is strengthened by another order of facts: we have lately seen three examples

* For the physical explanation of these signs we refer to the article Pericarditis.

of idiopathic pericarditis, and in all three pleurisy supervened, — single, and on the left side, in two cases; double in a third. In the last, which proved fatal, the priority of pericarditis was evident from inspection of the alteration, which was much more advanced in the pericardium than in the pleuræ. We do not however deny the possibility of rheumatic inflammation of the pleura. M. Chomel states (*Leçons Cliniques sur le Rheumatisme et la Goutte*) that he has seen pleurisy come on at least as often as pericarditis in acute rheumatism. He does not however relate any example of it; and if he speaks of pleurisy unconnected with pericarditis, his experience differs very widely from our own.

We have stated that the symptoms which characterise rheumatic inflammation of the heart come on in a large proportion of cases of acute rheumatism: of forty-three cases of which we have preserved accurate notes, these symptoms were present, and quite unequivocal in twenty-one, five of which were examples of pericarditis. This accords pretty well with the experience of M. Bouillaud, who however raises the frequency of these affections to a still higher standard, and states that they occur in the great majority of cases of acute rheumatism. The great frequency of these affections is well known to hospital physicians in London, where acute rheumatism is very prevalent.

In the publication already referred to, M. Chomel has not only denied that affections of the heart are common in acute rheumatism, but states that they occur only in rare and exceptional cases: but as he sets out with avowing his belief that gout and rheumatism are identical, his inferences as to the affections in question are all vitiated by the consequences of that belief. His arguments, grounded on the alleged insufficiency of the signs, generally considered to characterise these affections, have already been adverted to.

The period at which the cardiac disease comes on varies, according to our observation, from the eighth to the twenty-seventh day. In general, it may be said to come on when the disorder is at its height, but we have see none instance in which it was highly probable that pericarditis came on as early as the first day of illness. When the heart becomes affected the rheumatism of the joints does not subside, but continues as before; the fibro-serous textures of that organ do not become affected by *metastasis* from the joints, nor must their affection be considered as accidental, but as one of a series of local affections which implicate identical tissues in various parts of the body. There is no doubt that affection of the heart is most frequent in severe cases, as may be partly inferred from the following statement: — Of twenty-six patients, in whom rheumatism occurred for the first time, the heart became affected in sixteen, or nearly two thirds; but in five only of seventeen, in whom it had occurred once before or oftener: so that rheumatism of the heart was more than twice as frequent in the first as in the second series, and we have already seen that acute rheumatism is more severe in the first than in subsequent attacks.

This part of our subject would be incomplete if we did not point out in general terms the more remote sequel of these rheumatic affections of the heart. It is beyond doubt, that the remote effects of endocarditis are much more serious than those of pericarditis; for, when the latter terminates in cure by adhesion, the impediment which results to the functions of the heart is slight, and the consecutive change of structure in that organ is seldom considerable. We have seen a great number of cases of adhesion of the pericardium (often general) of long standing, in which the heart was in all other respects natural, and its functions during life perfectly performed. The consequences of endocarditis are very different. It will be seen in our remarks on the pathology of rheumatism, that the immediate effects of endocarditis are, to narrow the orifices at which the valves are placed, to impair the action of those valves by means of adhesions or by destroying their elasticity, and to substitute, for the naturally smooth surface over which the blood flows, a rough membrane, which, on the valves themselves, is often beset with vegetations. These different alterations have one common effect, which is, *obstacle* to the course of the blood; and the necessary consequence of that obstacle is, distension of those cavities which are

situated behind it in the course of the circulation. The heart labours in the discharge of its functions, and, by the operation of a general physiological law, its nutrition is promoted, and hypertrophy the consequence. The dilatation and hypertrophy increase, because the original obstacle remains, or perhaps increases, and because dilatation itself is a further cause of obstacle; for the force required to empty a cavity through a given orifice is greater, as the capacity of the cavity increases. At length the deviation from the natural structure of the heart becomes very great, and its functions suffer in proportion: all the distressing symptoms of advanced disease of the heart supervene, and sooner or later terminate in fatal dropsy. These deplorable effects follow with greater certainty and in shorter time, in proportion as the obstacle is greater which is offered to the course of the blood by the original morbid alteration of the lining membrane. It would be interesting therefore, as regards prognosis, if we could appreciate at an early period the degree of this obstacle. Laennec has remarked that "frémissement cataire," or purring tremour, is generally a sign of "notable" obstacle at the orifice in which it originates. Our experience confirms his statement. A lad, in whom this tremour was observed in a very marked degree when the valvular affection was only of a fortnight's date, was obliged to seek medical relief, a few months afterwards, for distressing symptoms of disease of the heart.

It is not ascertained whether or not the rheumatic affection of the valves may continue in a chronic form like that of the joints, or whether it be affected by the same circumstances. We are convinced, however, that the morbid alteration of the valvular apparatus increases in the course of time, although no fresh attack of acute rheumatism should occur. It is rational, therefore, to attribute the temporary præcordial pains, and other passing local symptoms which these patients occasionally experience, to slight returns of rheumatic affection of the valves. This is also a desirable conclusion as regards treatment.

In many cases of acute rheumatism symptoms of arachnitis come on, and lead rapidly to a fatal termination. In all the instances of this affection on record the heart likewise was affected. We have seen one case of recovery from this cerebral affection.

Diagnosis. Gout is the only disease which can be readily confounded with acute rheumatism. For a statement of the means of diagnosis between them, we refer to GOUT.

Pathology. In the description of the symptoms of acute rheumatism, it is stated that morbid effusions into the cavities of synovial capsules and serous membranes may be detected during life; we might thence be led to consider the membranes which enclose these cavities as the seat of the affection; but tissues of this kind do not enter into the composition of all parts that become affected with acute rheumatism; whereas there is one element which is never wanting, namely, the fibrous tissue: it is this tissue which is the primary seat of the local affection; the synovial capsules and bursæ, the serous membranes, and the lining membrane of the heart become affected secondarily, and only by reason of their intimate connection with the fibrous tissues which support them. This point, once established, will materially assist us in our inquiry into the character of the local affection; a question which has long been, and continues to be, a subject of warm debate with pathologists. In this inquiry we must not limit our attention to the effects of acute rheumatism on the joints (for that would give only a partial view of the subject), but also study them in those organs in which the fibrous tissue is invested with a serous membrane. There can be no doubt that the rheumatism of the fibrous tissue in these different situations is quite identical, and it therefore follows, that what is true regarding it in one situation holds good in another. The character of the local affection can thus be best determined by studying its effects in those situations in which serous membranes become implicated; for the true import of lesions of those membranes is well known, and pathologists are of one mind respecting them. The lesions which acute rheumatism produces in these mem-

branes prove the inflammatory nature of the affection, for it is impossible, by simple inspection after death, to discriminate between the appearances of common and of rheumatic pericarditis; serous effusion, false membranes, and sometimes pus, are present in both cases. On the lining membrane of the heart the evidences of inflammation are equally decisive. It is superfluous, therefore, to refer to the symptoms during life in corroboration of this view.

The opportunities of examining, after death, joints which have been recently affected with acute rheumatism, are extremely rare: there is some discrepancy in the few accounts of their condition which have been given by authors. In one instance of well-marked acute rheumatism, the course of which was cut short by fatal cholera, we found shreds of false membrane adhering to the synovial capsules of both knees. M. Chomel has described the joints of a person who died two or three days after cessation of the local affection in acute rheumatism; in one knee there was slight excess of synovia, which was viscous and semi-transparent, but the interior of all the joints examined was white and smooth.

The formation of false membranes in synovial capsules in acute rheumatism is, perhaps, not a common case, but we should not thence conclude that the affection of the joints is different in its nature from that of the fibro-serous parts, but that synovial are less apt than serous membranes to the formation of these peculiar morbid products. It is, then, our firm conviction, that the local affection in acute rheumatism is identical in all the parts it visits, and that its inflammatory character is as real in the joints as in the fibro-serous membranes. We have seen that during life the affection of the joints is attended with severe pain, local redness, swelling, and effusion of fluid; that much fever accompanies these local symptoms; and, that when blood is drawn it is always buffed and cupped; all which circumstances bear out what has been stated of the nature of the local affection.

We have already shown, also, that the affection is found, on attentive inquiry, to be much less shifting than is generally supposed, and that its usual duration in individual parts is ten days, and sometimes fourteen and more. We do not, however, argue, that the local affection is common inflammation, but that inflammation is an important element in its pathology, and the agent which injures the structure of the joints, by producing false membranes and permanent effusions in their cavities, and external thickening of their fibrous tissues; alterations which impede their movements, and tend to prolong rheumatism in a chronic form. The character of the local affection is not, therefore, an idle question. The agency of inflammation in acute rheumatism of the heart is too obvious to require further comment, but even in that organ it is undoubtedly of a specific nature; we have, moreover, shown that in rheumatic pericarditis there occur during life appreciable circumstances which distinguish it from common pericarditis. To make our statement perfectly accordant with the course of rheumatism, we must add, that the affection of an individual part does not always attain a degree which can be properly qualified as inflammation, since it sometimes subsides within forty-eight hours from its accession, terminating in what pathologists have named *delitescence*.

We have now to notice more particularly the effects of acute rheumatism on the internal surface of the heart. The primitive alteration consists in effusion, from the surface of the valvular apparatus, of lymph, which subsequently becomes organised. On the broad surface of the valves this lymph often assumes the form of a false membrane; but on the chordæ tendineæ and the edges of the valves, it is disposed in the form of grains, which vary in size from a pin's head to a millet seed.

These granulations are sometimes confluent; at others, discrete or isolated; and often stud, like a string of beads, the parts we have mentioned. It has been correctly remarked by Dr. Watson, that on the aortic valves they often form a double festoon, following a natural line of division in the structure of

those valves. The consistence of these morbid productions varies with their date: at first their substance is soft and friable, and of greyish colour, adhering very slightly to the lining membrane: as organisation proceeds they become more solid, of a nearly white colour, and adhere so intimately to the subjacent membrane as to make one body with it; the grains now resemble very exactly, syphilitic vegetations, and ultimately acquire cartilaginous hardness. The valves themselves are thickened and opaque, have lost their natural pliancy, and are sometimes puckered. In some cases lymph accumulates about the base of the valves in considerable masses, which occupy a large space in the cavity of the heart. This creates immediate and great impediment to the circulation, and dilatation and hypertrophy follow often with great rapidity.

All these alterations affect, especially, the valvular apparatus of the left side of the heart; and the mitral and aortic valves seem to be, in an equal degree, subject to them: the valves of the right side of the heart are much less so, and in a large proportion of cases of acute rheumatism are not at all affected; when they do suffer, the alterations are exactly of the same nature as those of the left cavities, and represent them in miniature.

This comparative exemption of the valvular apparatus of the right side of the heart is owing to its less tendinous structure; and, for the same reason, the pulmonary is less subject than the tricuspid valve to these alterations. Sometimes the affection extends to that part of the lining membrane which covers the muscular fibres: the appearances it produces are opacity and thickening of this membrane, and, but more rarely, the same kind of granulations as are found on the valves.

We have little to add to the remarks already made on the pathology of the joints. It is necessary, however, to state, that though the attacks of acute rheumatism be ever so frequent, concretions of lithate of soda are never formed, even in the small joints, and there is no fact to show that this salt is ever deposited in the course of rheumatism. We agree with M. Chomel, that the cases which have been cited by authors, as rheumatism terminating in suppuration in numerous joints, are cases, not of rheumatism, but phlebitis.

In those cases of rheumatism which terminate fatally, with symptoms of arachnitis, the appearances after death are by no means decisive. In no case on record were there found either false membranes or purulent effusion: in some, there were no morbid appearances; and in the rest, these were simply a turgid state of the vessels, and a small quantity of transparent or opaline serum beneath the arachnoid. As in all these cases there was also rheumatic inflammation of the heart, many pathologists have considered that the symptoms observed were connected with that affection, and not with an independent morbid condition of the membranes of the brain. Their reasoning is open to many, and, we think, insuperable objections, though it may be said that this question is yet quite undecided.

Causes. Remarkable individual examples occur, which leave no doubt that the tendency to acute rheumatism is, in some measure, hereditary, but in what proportion has not been ascertained, and this interesting question is still open. The circumstance of an individual having already suffered an attack of acute rheumatism, constitutes one of the most efficient predisposing causes known.

Of forty-five examples of acute rheumatism, taken indiscriminately, seventeen occurred in persons who had suffered from it, at least once before. Now the proportion of seventeen to forty-five is very much larger than that of persons who have had acute rheumatism to those who have not, in any given population, within the ages subject to the disease.

Men are more subject than women to this disease. Of the forty-five examples just mentioned fourteen only, or rather less than one third, were women; and these examples were collected in an hospital in which the admissions to the female medical wards were, for the time being, more numerous than those to the male wards. The greater liability of men is, perhaps, owing to their being more exposed to the exciting causes of rheumatism.

The great majority of cases of acute rheumatism occur in persons between fifteen and thirty years of age: we have never seen an example of it in a person beyond sixty or below eight; nevertheless, children not more than four years old have been affected with it. Persons between forty and sixty are, however, more liable to it than those below fifteen. Bichat ascribed the immunity of young children to the soft condition of the fibrous tissue which, not having acquired its ultimate mode of vitality, was, he thought, unapt to develop those maladies of which it is the peculiar seat.

Thus far there is some analogy between rheumatism and gout, as regards predisposing causes; but here that analogy ceases: free living does not dispose to rheumatism, nor does temperance preserve from it. Husbandmen, and the poor generally, suffer from it at least as much as the rich, and probably more; in fact, this disease is incident to persons of the most various constitutions and habits of life.

It has been erroneously maintained that a high state of nutrition predisposes to acute rheumatism. In eight of the forty-five cases, more than once quoted, the patients were weakened by previous indisposition when rheumatism came on. This is a proportion of nearly one in five and a half; now it appears from the tables of the friendly societies in England, that one in thirty-six only is constantly on the sick list. These tables are calculated for all ages above twenty, and for persons in nearly the same class of life as the inmates of hospitals. From this comparison it seems probable that debility predisposes to acute rheumatism: that it increases susceptibility of cold, is admitted on all hands.

The only known exciting cause of acute rheumatism is cold. This operates with more effect when it suddenly follow an opposite condition of the air, or when it acts on a person in a heated and perspiring state. This cause is recognised by the patient in the majority of cases, and there is no doubt of its reality.

Its effect is, in general, felt immediately, or, at furthest, at the end of a few hours. The cases are not rare, however (probably one third), in which acute rheumatism comes on without any appreciable influence of these circumstances; and in many, indeed, it is impossible, in our present state of knowledge, to assign any probable cause for the attack.

It is to be lamented, that the influence of seasons and climate has not been studied sufficiently to bear decisive evidence on this question. Acute rheumatism is much more frequent in the east than in the west of England. We doubt whether this can be wholly accounted for by the known difference of climate; but this is still an interesting field of inquiry.

Treatment. No single remedy is yet known, nor any plan of treatment, which has the power of cutting short the course of acute rheumatism.

The objects to be kept in view are,—1. to limit as much as possible the dissemination of the local affection, and, thereby, to diminish the chances of rheumatic inflammation of the heart; 2. to moderate that inflammation in those cases in which it may occur, with a view to prevent or diminish the amount of morbid productions, as well as avert immediate danger; 3. to diminish the severity of the affection of the joints, and to prevent it from continuing in a chronic form; 4. to procure sleep.

We have shown that rheumatic inflammation of the heart is most common in severe cases, especially when there is much fever, and the parts affected are numerous. It is our opinion, that it is the fever chiefly which tends to extend the rheumatic inflammation over a great number of parts, and thereby increases the liability of the heart, in common with other parts, to become affected with rheumatic inflammation.*

* M. Louis has shown that, in pneumonia, typhoid fever, and many other acute diseases, the extent and number of secondary lesions bear exact proportion to the degree of febrile movement, and there is reason to believe this to be a general law.

Our principal and leading indication is, therefore, quite clear: we must endeavour to moderate fever by appropriate means. None are so well qualified to affect this as general bleeding, which has the additional advantage of mitigating the severity of the local affection in those parts which already suffer. The measure of this remedy must be regulated by the degree of fever present, and by consideration of the resources of the patient. In well-nourished men it may be had recourse to twice in the early stage of the malady with signal advantage; but it should always be borne in mind, that there may be occasion for its repetition in a more advanced stage, on account of inflammation of the fibro-serous textures of the heart. This consideration should warn us from being prodigal of the patient's resources in the early stage, though it should not be allowed to produce over-timidity in the first use of the lancet. Much prejudice against bleeding has been kept up by the erroneous doctrine, that rheumatism of the heart is the effect of metastasis from the joints, which bleeding is supposed to favour. As this objection to bloodletting is speculative only, and necessarily falls with the error in which it originated, it needs no direct refutation. We may add, that in the forty-two cases already alluded to, in one half of which rheumatism of the heart came on, bloodletting was not practised until the accession of the cardiac affection.

Purgatives may be associated with bloodletting, but some evils attend their use; namely, the necessity of frequent movements, and some degree of exposure to cold: these evils may, however, be rendered very slight by good nursing, and then the moderate use of saline purgatives is attended with good effects. A dose of calomel, followed by a draught of senna and salts, may be given to begin with; after that the use of active purgatives should be restricted to the occasional exhibition of the same draught when the bowels are confined, which, if opiates are given, will generally be the case. In the intervals the patient may take about ʒ vj of citrate, and ʒ ss of nitrate of potash, in divided portions, daily, in the form of common effervescing draughts; or, in the same view (that is, of allaying fever), the eighth of a grain of tartarised antimony, and five grains of nitrate of potash, every four or six hours.

Much comfort is derived from opiates at night, and for this purpose the solution of muriate of morphia, or Battley's liquor opii sedativus, are to be preferred. A full dose of one of these should be given in pure water; the exact quantity of the drug will, of course, vary with the age of the patient, the severity of the pain, and many other circumstances. Opiates do not, according to our experience, produce bad effects, and the comfort they afford to the patient is so great that he is always most desirous of continuing their use. Such is the general treatment to be adopted in acute rheumatism. The great number of parts which suffer precludes the possibility of local treatment for all, and it must therefore be reserved for those in which the affection may be very severe, or of unusual tenacity. In general, it is most required for the hands and feet, the joints of which are more apt than any others to become the seat of permanent effusions and rheumatism in its chronic form. Our practice must, however, be guided by the circumstances mentioned. Leeches, varying in number from six to twelve according to circumstances, should be applied on or near the affected part; when the hands or feet are the subject of treatment the leeches should be applied on the wrists or insteps, and the bleeding promoted in the usual way. In cases in which there is much pain in particular parts, and local bleeding is, for some reason, deemed unadvisable or unnecessary, much relief may sometimes be afforded by lukewarm poultices, and their effect may be improved by impregnating them with laudanum or decoction of poppy.

If, in spite of these means, the affection of particular joints continues after fever has subsided, nothing gives such signal relief as blisters. These should not be kept open, but repeated at short intervals as the case may require. It is when effusions into the joints give indications of becoming permanent, that the beneficial effects of blisters are most conspicuous. The diet is easily re-

gulated. In the early stage of the disorder fever and loss of appetite interdict all solid or stimulating food; diluent and cooling drinks must be the sole support of the patient, and these may be varied to his taste; gruel, whey, weak broth, beef tea, and the like, are the first articles of nourishment to be allowed. In short the diet must be the same as in all acute diseases of an inflammatory type; the only deviation from it, which it is proper to make, is an earlier return to substantial food; especially in simple cases, for it will be found that when the strength of the patient is restored early, he will be less susceptible of the impression of cold in convalescence than he otherwise would have been.

Such is an outline of the treatment to be followed in those cases in which rheumatism is confined to external parts. When it attacks the heart also, the vital importance of that organ calls for more energetic measures. Bloodletting, either general or local, or both, according to the strength of the patient, must be had recourse to, and indeed must be the basis of the treatment. The practitioner should not, however, be led on to repeated and unmeasured abstraction of blood by undue fear of immediate danger, an error into which those not acquainted with the usual course of these affections are very liable to fall. If the symptoms continue urgent after the first bloodletting, the further abstraction of blood should be made, in general, by leeches or cupping; the practice must, however, be regulated by the urgency of the symptoms and the powers of the patient. When the patient is already weak, the blood which it is deemed proper to take should be drawn in the first instance by leeches or cupping, rather than by venesection; in fact, local bleeding should seldom be dispensed with. But the point of greatest importance is, that these means should be applied early, and, especially so, when the internal membrane of the heart is affected, because our object is to prevent the formation of morbid productions in the cavities of the heart, in which organ a mechanical obstacle becomes a source of irreparable and fatal mischief. This rule of practice cannot be too earnestly enforced. The practitioner should not be induced by the trivial aspect of the symptoms in endocarditis, to let pass the only moment at which he can hope to act with material advantage; for, however the means employed in a future stage may alleviate present symptoms, they will almost certainly fail to remove those alterations which we have seen to be the usual product of this affection. By a timely adoption of these means great and immediate relief is always afforded, and in most cases this relief is permanent: there can be little doubt, therefore, that if by this practice morbid alterations cannot be altogether prevented their amount may be greatly diminished.

Bloodletting is alike efficacious in pericarditis and endocarditis, and in our general recommendation of it we have therefore made no distinction between these affections. Pericarditis is attended with more immediate danger, and, on that account, it is sometimes necessary to carry bloodletting further than in endocarditis. The advantages of local bleeding, as also of blisters, are more immediate in the former than in the latter affection: blisters should not be applied until bloodletting has been carried as far as expedient, and until the heat of the surface has fallen to its natural standard; when applied to the præcordia under these conditions, they often seem to produce much relief. The blistered surface should be allowed to heal immediately. In the slight returns of pain and palpitation which occasionally occur in the convalescence, blisters always afford prompt relief.

The internal treatment already recommended need not be deviated from. In our opinion, experience has not proved the efficacy of mercury in these cases. We have seen the common practice of giving calomel and opium very extensively tried, and have never observed any marked improvement take place even in pericarditis, on the appearance of the constitutional effects of mercury, whereas these effects are invariably attended with marked improvement of symptoms in all diseases over which mercury exercises curative influence. In the numerous cases that have fallen under our notice, in which

rheumatism of the heart came on while the system was already under the influence of mercury, the course of that affection did not seem to be more favourable in consequence. We can also affirm from experience, that cases treated without mercury turn out equally well. We are aware that, in making these statements, we are much at variance with a large body of the profession in this country, and that, in raising a doubt, even, as to the efficacy of mercury in these affections, we render ourselves liable to be assailed from many quarters; but it appears to us that the use of this medicine in this and many other affections has been suggested, at first by imperfect analogy, and afterwards persisted in without further inquiry as to its effects. Such analogy, however perfect it may seem, must be considered merely as a motive for the trial of a medicine, but never as evidence of its efficacy, which experience alone can determine.

We have now to examine the merits of various remedies and plans of treatment for acute rheumatism, which have at different times been much praised, and which have more or less engaged the favour of the medical public. Colchicum has long held, and continues to hold, an ill-deserved reputation as a remedy for acute rheumatism. Having in eleven cases taken careful note of its effects, we did not remark in any one a favourable influence on the course of the disease; in six of the eleven the constitutional effects of the drug were produced in a very marked degree. From observation of numerous other cases we have been convinced of its entire inefficacy, and this conviction is also held by many physicians of great experience. It is easy to account for the maintenance of its reputation: acute gout, when much disseminated, is often mistaken for rheumatism; and the remarkable success of colchicum in these cases confirms medical men in their erroneous estimate of its virtues. Hence, also, the assertion that the efficacy of colchicum is more marked in the synovial than in the fibrous form of rheumatism, for, in gout effusions are, generally speaking, more conspicuous than in rheumatism.

We have already spoken of calomel in combination with opium in the treatment of rheumatism of the heart. The dangerous nature of that affection may sanction, and, according to some, peremptorily calls for the employment of this remedy; but it is also much used in the treatment of acute rheumatism in the first instance, when extension to the heart has not taken place. In our opinion, however, it is wholly without virtue; and when its use has not been preceded by bloodletting it has the effect of increasing the fever. We have kept accurate notes of eleven cases in which it was used, in eight of which the constitutional effects of mercury were well marked. In not one of these did any decided amendment occur when these effects appeared; in four, on the contrary, an unfavourable change took place at that time, and in three of these four, extension of rheumatism to the heart occurred while the mercurial symptoms were present. These four cases were very protracted.*

Sudorifics have been very popular in the treatment of acute rheumatism, and still enjoy a high reputation with some. They are much used in the Infirmary of Edinburgh, where it is taught that, strong sudorifics employed after bloodletting in the early stage of the malady, often shorten its course in a remarkable manner. We confess that our objections to sudorifics are speculative merely, and founded on the consideration that sweating is naturally very profuse in acute rheumatism, and that, far from relieving pain, is more profuse as the pain is more severe. The warmest advocates of sudorifics state, however, that their efficacy is much less marked, or even questionable, after the very early period of the malady. Their use should always be guarded by previous bloodletting, and be promoted by warm diluents; for, otherwise they are apt to fail in their sudorific effect, and in that case they invariably increase the fever. There is another objection to their use; the relaxation of the skin, which they

* This furnishes us with an analogy which may be applied to estimate the probable effects of mercury on rheumatism of the heart with much greater strictness than any analogy drawn from the effects of this medicine in other diseases.

produce, renders the patient remarkably susceptible of cold in convalescence, and thereby predisposes to relapses.

The employment of Peruvian bark was first suggested by the remittent character of acute rheumatism, and, like all other reputed remedies, it soon enlisted warm partisans. Dr. Haygarth, especially, was unqualified in his praises, but experience has shown that they were not deserved. Peruvian bark is now justly abandoned as a remedy for acute rheumatism, and its use, or rather that of sulphate of quinine, is restricted to those cases in which some tonic is required in the course of convalescence. The inefficacy of tartarised antimony, in large doses, has been well shown by M. Dance, in a memoir on the subject. We have ourselves made extensive trial of this plan of treatment, and our experience accords entirely with his. Before we conclude, we must warn our readers against the danger of the repeated and unmeasured abstraction of blood, lately recommended by M. Bouillaud. The alleged efficacy of this treatment is entirely without proof, for the statements he gives in support of it are wholly inconclusive. On the other hand, he says nothing of the serious evils which must follow this sudden and excessive loss of blood, which, in females especially, must frequently occasion, for many years, total subversion of health, and if not entire ruin of the constitution, a most deplorable train of nervous symptoms, and permanent languor of all the functions.

2. *Chronic rheumatism.* Chronic is often the sequel of acute rheumatism, but also comes on in some cases quite independently of any previous acute attack. In either case the affection is of much the same character as acute rheumatism, the chief difference being less activity, with indefinite duration of all the symptoms. Fever and sweating are seldom present, and occur only when the local affection partakes of an acute character; in severe cases (the active chronic rheumatism of authors) these circumstances may continue with few intermissions, for many months, and the sufferings are then extremely harassing. In active chronic rheumatism the effects on joints are much the same as in the acute form; effusions take place into all the varieties of synovial capsules, and ligaments become permanently thickened by long continuance of the affection. Thus the form of joints is much altered, their motions painful and impeded; and, when the disease does not yield to the remedial means employed, their structure becomes ultimately so materially injured as to cause premature and lasting decrepitude, while the continuance of harassing pain and fever waste the body and destroy the health. One remarkable feature of the disease is, that similar parts become affected so exactly alike, that the distortion of one joint is usually a perfect model of that of its fellow; and the same is true even of bursæ and tendons. As happens in acute rheumatism the pain is more severe at night than by day; it is relieved or aggravated by warmth, according to the greater or less activity of the disease, and perspiration generally affords temporary relief. The patient is very sensible to the state of the weather, and usually worse in a moist and cold, and better in a warm and dry air: hence recovery commonly takes place on the approach of summer; it is seldom, however, complete, for the joints do not regain their natural state, and the invalid is much disposed to relapses on the return of the cold season.

In its less active form chronic rheumatism is distinguished by pain of the joints, which is increased by their movements, but is unattended with swelling or local heat; the patient often complaining of an unpleasant feeling of coldness in the part affected. This form is much less serious than that just described: it seldom disables the patient; does not impair the general health; does not become disseminated; nor does it affect appreciable changes of structure. Cold is its immediate cause, and the part which suffers is that which has been most directly exposed to it. There is one remarkable point of difference between acute and chronic rheumatism; in primitively chronic rheumatism the heart never becomes affected. Many diseases, of which the exact nature is not known, but which seem to have some affinity with chronic rheumatism, have

been included under that term, to the great confusion of the subject. One of the most remarkable of these is spoken of by Sir B. Brodie, in his chapter on Inflammation of the Synovial Membranes of Joints, in the following terms: "There is a remarkable yet not uncommon form of the disease, which may be considered as bearing a relation to both gout and rheumatism, yet differing from them both in some essential circumstances. The synovial membrane becomes thickened so as to occasion considerable enlargement of the joints, and stiffness, there being at the same time but little disposition to the effusion of fluid. In the first instance the disease is often confined to the fingers; afterwards it extends to the knees and wrists; perhaps to nearly all the joints of the body. Throughout its whole course the patient complains of but little pain, but he suffers, nevertheless, great inconvenience, in consequence of the gradually increasing rigidity of the joints, and the number which are affected in succession. The progress of the disease is usually very slow, and many years may elapse before it reaches what may be regarded as its most advanced stage. Sometimes, after having reached a certain point, it remains stationary, or even some degree of amendment may take place; I do not, however, remember any case in which it could be said that an actual cure had been effected. The individuals, who suffer in the way which has been described, are, for the most part, those belonging to the higher classes of society, taking but little exercise, and leading luxurious lives; but there are exceptions to this rule, and the disease occasionally occurs in hospital practice, in men and even in females of active and temperate habits." We have seen one example of this affection, in which the disposition to effusions was very remarkable, and especially the rapidity with which considerable effusions into the knees from time to time took place, and were again absorbed. We believe that this affection is essentially different both from gout and rheumatism; the most remarkable point of difference being the signal freedom from pain enjoyed throughout its course. It is probable that synovial membrane, and not fibrous tissue, is the primitive seat of the affection.

Treatment of chronic rheumatism. This disease often baffles the seemingly best directed treatment, and has become a reproach to medical art. When, however, the structure of joints is not permanently altered, we may hope to procure much benefit, especially by local treatment. This must vary according to the activity of the local affection: when there are indications of an active inflammatory process, local bleeding must be first had recourse to. When the affection is of a less inflammatory character, or has been moderated by local bleeding, our chief reliance must be placed on a succession of blisters, applied upon, or in the immediate neighbourhood of, the parts affected. When there is much pain great relief will be obtained by dressing the blistered surface at night with one fourth or one third of a grain of muriate of morphia, which will also procure sleep as effectually as if given by the mouth. But it often unfortunately happens that local bleeding and blisters cannot be employed to a sufficient extent, in consequence of the multiplicity of local affections, or of constitutional debility: and, as there are no general remedies, at present known, which exercise a directly beneficial influence on these affections, the two circumstances mentioned deprive us of our best resources, and render the treatment in a great measure nugatory. The general remedies usually employed in these cases are diaphoretics: Dover's powder, guiacum, and sarsaparilla are those which enjoy the greatest reputation, but their effects are after all very uncertain, and in most cases questionable. When there is much fever their use is improper; while the feverish state lasts the internal treatment must consist in the use of mild purgatives and salines. The eighth of a grain of tartarised antimony and five grains of nitre, given three times a day as recommended in acute rheumatism, will be found a very cooling medicine: we disapprove of general bleeding, because the good obtained from it is not sufficient to counterbalance the debility it produces. Warm baths judiciously employed are often of great benefit, and salt baths are to be preferred. There is a medicine which, from its great success as a remedy in affections of the periosteum, has lately

come much into fashion in all forms of chronic rheumatism : we allude to the hydriodate of potash Our own experience does not bear out the high encomiums which many have bestowed upon its efficacy in this disease; in many cases it has seemed to produce marked benefit, while in others it has totally failed. The results at present known certainly encourage further trial. The dose should not exceed five grains three times a day.

Diligent friction, especially when practised in the method called shampooing; warm affusion conducted so as to impart a mechanical shock, and long perseverance in attempts to exercise the parts, often produce remarkable effects. In inveterate chronic rheumatism in our own country, all these means applied in the most judicious manner often fail to produce any permanent or solid advantage. We have yet to mention the most valuable resources known in the treatment of this disease ; namely, a warm climate, and the internal and external use of thermal mineral waters. A long residence in a warm climate has often effected remarkable cures : Rome and Nice are the most eligible situations in Europe, but the climate of the West Indies seems to exercise a still more beneficial influence over this disease.

The beneficial effects of thermal mineral waters are now well established, and examples are not wanting of persons who have visited them quite in a crippled state, and have returned with their limbs restored to pliancy and use. The waters most celebrated in France are those of Neris, Mont-Dore, and Vichy; Aix-la-Chapelle in Savoy is much resorted to ; and in Germany, Karlsbad and Wiesbaden. When the circumstances of the patient allow it, the beneficial effects of these waters might be confirmed by a winter's residence at Rome. It is almost superfluous to add, that in all cases patients should be carefully protected from the influence of changes of weather ; a complete dress of flannel next the skin is of great importance ; the diet should be mild and simple, not too low, but regulated with the view to promote the general health.

Muscular rheumatism. We have already stated, in the description of acute rheumatism, that the muscles, or rather their fibrous coverings, become affected along with the joints : the muscular affection of which we now treat is quite independent of rheumatism of the joints, although it often occurs in persons subject to acute articular rheumatism. It is more common in muscles of the trunk than in those of the limbs, and, usually, not more than one muscle is affected at a time. Its essential character is pain of the muscle affected, the pain being very much aggravated by any attempt to use the muscle. The pain is not attended with swelling, local redness, or heat; and the patient commonly has a sense of coldness in the affected part. Febrile excitement is very rare, even in the severest forms of this affection. Cold is almost its only exciting cause, and the influence of this agent is generally so obvious as to attract the attention of the patient. It very commonly happens that the muscle which suffers is that one which has been most directly exposed. The most important varieties of this affection are lumbago and pleurodynia, and to these we shall specially direct our attention. In the detail of their symptoms we shall have little to add to what has been already said of the affection generally.

Lumbago. The pain of lumbago occupies the fleshy mass of the loins on one or both sides, and is very much increased by every movement of the back. When the affection is severe the patient is not only confined to bed, but quite incapable of moving his body without the help of others ; and every change of posture causes excruciating pain. In milder cases the invalid can still walk, but with his body quite upright and stiff : he also chooses the most even ground, is unable to stoop, and when he turns, it is by a movement of the entire body.

Lumbago cannot well be confounded with those lumbar pains which are often the preliminary of febrile diseases, for these pains are scarcely or not at all aggravated by motion, and are attended by other symptoms which point out their character; nor with affections of the kidney or uterus, for these may be readily detected by their peculiar symptoms. It has been said, that caries of the spine, and some affections of the spinal cord, present greater difficulties ; but

in the former, the pain is not aggravated by motion in the very remarkable way in which it is in lumbago; and when motion is attended with much pain in caries of the spine, other and characteristic symptoms are usually present. The lesion of sensibility and motility in the lower extremities, in all affections of the cord itself, is sufficient to distinguish them from lumbago. Lumbago sometimes proves of long duration, and does not readily give way to treatment: it is also very apt to return.

Lying on the grass in summer is one of its most common causes, and it is sometimes brought on by a sudden and violent effort of the lumbar muscles.

Pleurodynia. Pleurodynia is characterised by an acute pain, which has usually the seat and character of the pain of pleurisy, and by the absence of the physical signs and general symptoms of the latter affection. The pain is generally felt a little below the breast, and is increased by pressure, by movement of the body, and still more by the act of breathing, and by cough, if present. One effect of this painful state of the intercostal muscles is, that the inspiration on the affected side is less ample than on the other, ~~and~~, consequently, the respiratory murmur is not quite so loud, nor the sound of percussion so clear, as on the healthy side; this is, however, very different from the dulness on percussion, and the altered character of respiratory murmur in pleurisy. In pleurodynia there is seldom fever; in pleurisy fever is rarely absent: as a general rule, the pain is more acute and more diffused in the former than in the latter affection. When the general symptoms and the physical signs are carefully inquired into, there can be seldom any difficulty in the diagnosis.

Pleurodynia is occasionally brought on by exposure to cold, at other times by cough or sneezing: in some cases its cause escapes observation.

It remains for us to speak of a slight but painful affection popularly designated *crick of the neck.* It consists in a very painful condition of the muscles of one side of the neck, which causes an inclination of the head to the side affected. Any deviation from that posture is attended with such severe pain that the patient cautiously avoids all independent movements of the neck, keeping the head in a fixed and characteristic attitude. In the state of rest the sensation in the part is more that of numbness than of pain. It is sufficient to know, that inflamed glands or a phlegmon may produce similar appearances, to prevent our being misled by them.

This painful malady is generally of short duration. It is often brought on by exposure of the neck to a draught of cold air; sometimes by a sudden and abrupt turn of the head.

Rheumatism of the muscles of the limbs is not so severe and acute an affection as those varieties just described: it is also more wandering; and it is in rheumatism of these muscles that the sense of coldness in the affected part is most frequently complained of. The muscles nearest the trunk are the most subject to it, those of the arm and thigh being much oftener affected than those of the fore arm and leg; a circumstance first noticed, we believe, by M. Chomel. Rheumatism of these muscles does not disturb the general health, but often proves very tedious. It may be confounded with syphilitic pains by an inattentive observer. Syphilis is to be distinguished by the previous history of the patient, by the altered form of bones, and by other characteristic symptoms.

M. Chomel has described rheumatism of the abdominal muscles, but the case which he gives as a type of that affection, at page 73. of his *Leçons Cliniques sur le Rheumatisme et la Goutte* seems to us to be a case, not of rheumatism, but of neglected constipation. We have never seen these muscles affected with rheumatism.

This naturally leads us to remark, that pains sympathetic of visceral derangement are very apt to be confounded with rheumatism of the muscles. An affection simulating rheumatic lumbago or pleurodynia, is a very common effect of accumulations or obstruction in the large intestine; a fact which should always be borne in mind by the practitioner. Pain in the limbs, also, is often merely indicative of derangement of the abdominal viscera. The chief

distinctive character between these pains and those of rheumatism is, that the former are scarcely aggravated by motion, whereas the latter are so to a great degree.

The *treatment* of muscular rheumatism must vary with the seat and degree of the affection. In severe lumbago, abstraction of blood from the loins by cupping is the most certain remedy, and often effects an immediate and perfect cure: it may be repeated with advantage if the symptoms are not completely relieved by its first employment. Narcotic liniments should also be freely used: the patient should be kept in bed, be moderately purged, and live low. If the affection continues after a fair trial of these means blisters must be applied to the loins, and the blistered surface may be dressed with muriate of morphia in the way described in the treatment of chronic rheumatism. Turpentine and balsam of copaiba have been extolled as remedies for lumbago; in our experience, the latter has in some cases seemed to succeed after the means described above had been tried without material benefit. It should be given in doses varying from twenty minims to ʒ ss three times a day. In all cases of lumbago, one of the most important points of treatment is to confine the patient to bed.

Pleurodynia is less obstinate. We have often known it completely removed by a mustard poultice applied over the seat of the pain. Opiate liniments are also frequently successful; but if the affection be unusually severe blood should be taken by leeches or cupping: it seldom fails of being relieved by this measure. A blister and the local application of muriate of morphia will complete the cure.

In crick of the neck the local treatment may generally be limited to diligent friction with laudanum, warm fomentations with poppy-head decoction, and warm clothing of the part. More powerful measures are seldom needed: leeches afford immediate relief; but in females, especially of the better classes, they are inadmissible, on account of the permanent marks they leave; blisters are open to an objection of the same kind. Warm baths to the chin are often serviceable.

Rheumatism of the muscles of the limbs must be more generally treated by stimulating and opiate liniments: local bleeding is not advisable; but if the affection is obstinate blisters may be had recourse to with great advantage.

GOUT.

Synonymes.— Symptoms of acute gout — of chronic gout.— Gouty concretions.— State of the urine in gout.— Gouty affections of external structures — of internal organs.— Diagnosis.— Pathology.— Causes.— Treatment.— Prevention.

The term Gout, derived from the Latin word *gutta*, a drop, was first employed to designate the disease we treat of, by physicians of the old school of humoral pathology, and was adopted in accordance with their theory, that the local affection in gout is caused by the distillation, "drop by drop," of a peccant humour into the structure of the joints. As this theory was very general, we accordingly find synonymes of the word *gout* in most European languages:— *Gicht* (Germ.), *goutte* (Fr.), *gotta* (Ital.), *gozza* (Span.).

Some modern physicians have endeavoured to substitute for this word the term *Arthritis*, intended to express a different theory of the disease; but as this theory is at least as imperfect as the old one, the word *gout* should be retained, were it only on the title of priority. Gout was well known to the Greek, Roman, and Arabian physicians. The Greeks gave the local affection special names, derived from those of the parts which happened to be affected. Gout of the foot was called ποδάγρα; gout of the hand, χειράγρα; and so on. It appears from their writings that the ancients confounded gout with rheumatism, and considered them one disease; although most moderns distinguish them in theory, yet the serious error of mistaking gout for rheumatism is often committed in practice.

Gout has in all times been observed to affect chiefly the rich and well-fed members of society; and it may be gathered from the pleasantries of many Greek and Latin authors, that the victims of this disease were not favoured with a greater measure of sympathy in ancient times than they enjoy in our own. It very seldom comes on before the age of thirty or thirty-five, never before puberty, and is very much more rare in women than in men. Spring and autumn are the most common seasons of its attack, but summer does not wholly preserve from it.

Symptoms. The first fit of what may be termed *acute* gout is sometimes preceded, for a few days, by slight derangements of health, but more frequently comes on suddenly, and often without obvious cause. The suddenness of the attack, in some cases, is very remarkable. It is generally at night that the first symptoms are felt. The patient is awakened soon after midnight by acute pain in the first joint of the great toe of one foot. This pain is often preceded by, or attended with, slight rigor, which is soon followed by fever with great restlessness. These symptoms continue; and the next morning the affected part is of a bright red, much swelled, and exquisitely tender. The joint is quite disabled, and the neighbouring veins are very turgid. In slight cases the symptoms abate towards morning; but, in severe ones, the pain continues to increase for about twenty-four hours from its first accession; it then suddenly remits, and the affected part, when examined, is found to be more swelled than before, and also œdematous; in some cases the skin of that part has a shining appearance, as if varnished. At this crisis, gentle perspiration comes on; and the patient, relieved from pain, falls asleep. The relief from pain is often so sudden, that, as Sydenham remarks, the patient is inclined to attribute it to the last position given to the gouty limb. As the pain abates, the fever subsides, and this improvement continues until the following evening. The symptoms then return, and the patient is harassed throughout the night with acute pain and fever; the next morning these abate as before. The disease continues to hold this course, but the symptoms gradually diminish in severity; and at the end of a period, varying from five to ten days, the patient is generally restored to his usual health. The œdema, which at the height of the paroxysm is very considerable, continues for a short time after the cessation of the other

symptoms. In convalescence, the cuticle of the affected part peels off — a process usually attended with much itching. In the first fit of gout there is seldom more than one joint affected, and the attendant fever seems proportional to the severity of the local affection. There is much loss of appetite, and increase of thirst; the urine is scanty, and deposits, on cooling, an abundant brick-coloured sediment. The bowels are generally confined.

Such is the usual course of a first fit of gout; but it often happens that, before experiencing so well-marked an attack as that described, the patient has, at times, suffered some degree of lameness and soreness of one foot, of which the true cause was not suspected.

Some of the circumstances we have noticed, must now engage more particular attention. We have stated that, in most cases, the attack cannot be ascribed to any obvious cause; in some, however, it seems the effect of a local injury, as a bruise or sprain; and when the gouty inflammation which follows is not attended with much constitutional disturbance, the error into which the patient has fallen, regarding the nature of his malady, remains uncorrected. We have known instances of first gout being mistaken for a sprain, both by the medical attendant and patient, and treated accordingly; but, in general, the sprain is a pretext adopted by the patient in order to escape the imputation of being gouty, to which most persons have a great aversion. Convivial excesses are sometimes the immediate cause of the paroxysm. The œdematous nature of the swelling in gout is of some value as regards diagnosis; it is not always present, but is seldom wanting when the affected part is not deep-seated; it is more frequent and more extensive, when it does occur, than in acute rheumatism. Desquamation of the cuticle is the sequel of erythema of the skin, which, like œdema, is most common in gout of superficial parts. This erythema is sometimes wide-spreading, and in appearance much like erysipelas. After it has been some time present, its original bright red tint generally changes to some shade of purple. Œdema and desquamation are most common in gout of the hands and feet, and are therefore seldom wanting in the first fit. One of the most remarkable circumstances in the history of the first fit is the great proportion of cases in which the great toe is alone affected. Sir C. Scudamore found this the case in 130 of 193 instances; in other 10, the gout was limited to the two great toes, and in all, except 8, the joints affected were exclusively those of the foot and ankle of one or both legs.

In those rare cases in which many joints become affected in the first attack, its duration is prolonged, sometimes to a period of several months. After recovery, the functions of the joints which have suffered are not sensibly impaired.

When those causes which foster the gouty diathesis continue to operate, the attacks do not fail to return, their frequency depending, in great measure, on the degree of influence which these causes are allowed to exercise, and on the hereditary predisposition of the individual. In general, however, there is an interval of a year, at least, between the first three or four attacks, and we have even known a period of seventeen years elapse between the first and second. In these subsequent attacks, the local affection is limited to the part affected in the first gout, or to that part and the great toe of the other foot; seldom more than one or two joints are affected at once. It is worthy of remark, that fits of gout often observe an exact periodicity in their return; occurring with great regularity in a given month for many successive years.

When the gouty diathesis is confirmed, the paroxysm is generally preceded, for a period which varies greatly in different cases, by transient gouty twinges in the parts about to be affected, or by various derangements of important functions. These derangements, either on account of their peculiar character, or because they suddenly cease when gout is developed in the extremities, are fairly presumed to be essentially connected with, or rather part of, the disease; and it is, therefore, important to give an account of them in this place.

Indigestion, with unusual tendency to heartburn and sour eructations, so frequently precedes the gouty paroxysm, that theories of the intimate nature

of gout have been founded on the consideration of this single circumstance. This form of indigestion may continue for months before gout appears in the extremities, and indeed gouty persons are at all times singularly liable to it. The secretion of urine is deranged not less frequently than digestion. In some cases the urine, for a few days immediately preceding the paroxysm, is scanty, high-coloured, and much charged with red deposit; in others, on the contrary, it is unusually abundant, pale, and limpid — a condition observed, for the most part, in the urine of persons of nervous temperament or exhausted constitution.* Severe headachs, with disturbed sleep and great languor, are perhaps the next in order of frequency as precursory symptoms; and low spirits and despondency are very remarkable and very common indications of an impending paroxysm. Palpitation of the heart, recurring at uncertain intervals for many weeks, and in other cases attacks of difficult breathing resembling asthma, have been known to precede the gouty paroxysm, and to give way suddenly and permanently to development of gout in the extremities. But when regular paroxysms of gout have already occurred, there are generally other and more characteristic symptoms to announce their approach. Such are transient gouty twinges, as before stated; also, soreness and stiffness of the feet, especially after exercise; suppression of their habitual perspiration, and, occasionally, cramps in the gouty limbs: these symptoms sometimes occur alone, but are more often associated with some of the functional derangements noticed above. It is important however to add, that even in cases of confirmed gouty diathesis, a severe paroxysm sometimes comes on without any precursory symptom, or at least without any of sufficient moment to attract the attention of the patient.

In some persons, gout, however numerous its attacks, never affects any joints but those of the feet; in all, the feet and hands suffer more than other parts. In most cases, however, it becomes more disseminated; and when the diathesis is very confirmed, many external parts are affected in a single fit.

In a case of chronic gout (the sequel of an acute attack), which lately fell under our observation, the left knee was much distended with fluid for nearly two months; there was also pain of the chest, with difficulty of breathing; and these symptoms were found to depend on gout of the sternum and cartilages of the ribs, marked by great local tenderness and considerable œdema. In severe attacks of acute gout, the insteps, ankles, knees, elbows, and wrists, may suffer in turn, or several of these parts may be affected at once. In addition to the appearances described as present in the first fit of gout, we now observe abundant effusions into capsules of joints, into bursæ and sheaths of tendons. We have seen the capsules of both knees, and the bursæ on the olecranon of each elbow, greatly distended with fluid, while there was also considerable effusion into the tendinous sheaths of the wrists and ankles.† In such cases the pain is excruciating, and is described by the patient in superlative terms. Thus it is hyperbolically compared to crushing the joint — to forcibly tearing it asunder — to pouring boiling lead on the part — to the gnawing of a dog; and the like. There is much throbbing in the affected parts, with a sense of great tightness and of cumbrous weight. As effusion proceeds, the acuteness of the pain diminishes, while the throbbing and sense of weight continues. ‡ The sufferings are often aggravated by cramps; the weight of the bed-clothes is insupportable, and the tread of another person across the chamber is painfully felt by the patient. If the affected parts be enveloped in flannel, a copious exudation from their surface takes place, emitting a peculiar and characteristic odour, which often pervades the whole apartment.

While the joints are in the condition just described, there is also much fever.

* In appreciating the quality of urine, it is essential to ascertain the proportion of diluents used by the patient; and the morning urine is, for obvious reasons, to be selected for examination.

† Cases of this description are often mistaken for acute rheumatism by inattentive practitioners.

‡ This diminution of pain on the supervention of effusion is analogous to what occurs in pleurisy, pericarditis, and many inflammations that terminate in effusion.

The face is deeply flushed; there is total loss of appetite; urgent thirst, with furred tongue and confined bowels. The urine is scanty; its specific gravity increased, and on cooling it deposits an abundant brick-coloured sediment, together with much mucus. When the urine is inordinately charged with this deposit, there is often pain in the bladder, and scalding in the urethra when the urine is voided. In a very severe fit of gout, the pain and fever may continue without remission for the first three or four days. After this, the symptoms abate towards morning, to become worse again as night approaches. If no curative means be had recourse to, several weeks, or even months, may elapse before permanent convalescence is established; but during this period a transient respite from pain and fever, for a few days, may happen more than once. True convalescence is indicated by gradual diminution in the severity of the exacerbations; cessation of fever; restoration of the healthy characters of the excretions (especially of the urine); and return of appetite. At this period, the patient is thin and feeble; the gouty joints are weak, puffy, and œdematous, or their capsules still distended with fluid. The weakness of the gouty limb is, in some cases, very remarkable, almost amounting to paralysis. When, however, the structure of the joints has not been materially and permanently injured, nor the constitution broken down by a long series of attacks, recovery is pretty complete; the œdema about the gouty joints gradually subsides; effusions become absorbed; and, with returning strength, the patient regains a tolerably free use of his limbs. The ailments we have described as preceding the fit are for a time removed, and the general health thereby much improved.

Chronic Gout. When the favourable conditions just stated are reversed, it more commonly happens that the fever subsides, the local affection becomes less inflammatory in character, and gout continues in a *chronic* form. In this form the parts affected are either of natural colour, or much less red than in *acute* gout; the pain of the joints is less severe and more wandering, in many cases alternating with pain and cramp in the stomach; but copious effusions still take place into capsules of joints and into bursæ, and continue many months. In chronic as in acute gout the pain of the joints increases at nightfall, and is then generally attended with slight fever, rendering the patient watchful and restless. The limbs are disabled for exercise, and the patient always evinces much caution in changing their posture. The general health is much impaired, the complexion sallow, the countenance haggard; there is great languor, debility, and depression of spirits; appetite is uncertain, and digestion difficult, with much disposition to heartburn. We have here described chronic gout as the sequel of acute attacks; but it may also be primitive, and follow the course described without having been preceded by acute gout. In inveterate chronic gout the patient has scarcely any respite, except during two or three of the summer months. It is in cases of this kind, chiefly, that concretions are observed, which, when of considerable size, or occupying cavities of joints or the texture of tendons, tend more than any other circumstance to render gout permanent. These concretions, however, are formed much earlier in some cases than in others. The matter of which they consist is at first semifluid hydrated lithate of soda; and (as we shall hereafter more particularly notice) a layer of it, of the consistence of thin plaster, is often found coating that part of the synovial membranes which covers the heads of bones. The more fluid parts of this matter become gradually absorbed, leaving the salt alluded to in the form of a solid friable concretion. Such concretions receive additions to their substance not only from the effusions of successive paroxysms, but also, in the intervals of these, from the gradual deposition of lithate of soda; and in this way they often attain a large size. They are most frequent, and larger than elsewhere, in the joints of the hands and feet, which they distort into most unsightly shapes; but there are few parts subject to gouty inflammation altogether exempt from such concretions. Their presence modifies a fit of gout both with regard to its course and local

appearances. Their condition in a paroxysm is admirably described in the following passages, which we quote from a paper by Mr. James Moore: —

"When a violent fit of the gout attacks a chalky tumour, the appearance is frequently very alarming, the new paroxysm being accompanied with a fresh serous and chalky effusion, which, added to the old deposit of chalk, occasions a prodigious swelling; the cutis, when distended to the utmost, opens, yet sometimes the cuticle remains entire. The chalky or serous fluid may then be seen through the semi-transparent epidermis. The surrounding integuments appear of a deep red or purple hue, threatening mortification, while the pain is excruciating. At length the cuticle gives way, a discharge of serum and chalk takes place, and a remission of all the symptoms usually follows. During the whole of this alarming process, suppuration never occurs; but soon after the opening has taken place suppuration commences, and chalk and pus are then discharged from the ulcer. When an opening is formed, the whole of the chalk never escapes, and its complete evacuation is usually a very tedious process. This is owing to its being diffused through the cellular membrane, as in the cells of a sponge. One cell must sometimes give way after another, and small portions of chalk are successively thrown out; so that months and even years pass away before the whole is discharged. It also frequently happens that the orifice contracts and closes over, leaving portions of chalk underneath. This kind of cicatrix sometimes stands its ground, but more commonly breaks out again and again to discharge chalk. Even openings into joints, which are so dangerous when occasioned by other extraneous bodies, are often attended with no serious symptoms when the joint is filled with chalk." (*Med. Chir. Trans.* vol. i.)

Mr. Moore remarks justly, that the suffering occasioned by these concretions is not owing to any irritating quality they possess, but to the pressure and distension occasioned by their bulk, and to the obstruction they offer to the motion of tendons and joints.

It has been stated already, that during the paroxysm of gout the urine deposits a copious brick-coloured sediment composed chiefly of lithates. Sir. C. Scudamore has ascertained that, at the same time, the urine contains an excess of urea, as indeed of all solid ingredients. Dr. Prout has made some interesting observations on these points. Speaking of urinary deposits in febrile diseases generally, he says, "The deeper the colour of the sediment, and the more approaching to red, the more severe, in general, the symptoms; and it may be mentioned, that the most decided and most strongly marked specimens of the kind which I have seen, have been deposited by the urine of gouty individuals, in which case, as before observed, the sediments consisted chiefly of lithate of soda, and the tinging substance appeared from the tint to be the purpurate of soda." (*Treatise on the Diseases of the Urine*, p. 123. 2d ed.)

It is proper to add that the urine, however much charged with the material of these deposits, is tranparent when first voided, and that red deposits are not uncommon in other febrile diseases; in rheumatism especially they are very copious; scarcely less so than in gout.*

But it is also common for gouty persons to pass an excess of lithates in their urine in the intervals of gouty paroxysms, and these persons are more liable than others to gravel and calculus of lithic acid origin. Dr. Prout says, "Besides these amorphous sediments, consisting chiefly of lithic acid, I have seen two or three instances in which large quantities of perfectly white lithate of soda were deposited from the urine. In one case, in particular, the quantity was immense, and voided, not only mixed with the urine, but in a state of consistency like mortar, especially during the night, so as to produce great difficulty in passing the urine. I suspected the existence of gouty irritation or abscess in the kidneys in these cases." (*Ibid.* p. 127.)

* Sir C. Scudamore has endeavoured to connect these deposits in gout with derangement of the liver: in acute rheumatism it seems impossible to do so without indulging in unwarrantable hypothesis.

The deposition of lithate of soda in joints and other parts affected with gout, proves that the formation of this salt is not a functional act of the kidneys, and the separation of it from the blood by tissues so remote from one another, and so various in structure, further proves that it exists already formed in that fluid.*

Hitherto we have described gout as affecting chiefly the structure of joints: they are indeed its most common seat; but many other parts, including some of the viscera, are subject to its morbid action. Of external parts, almost all that are composed of fibrous tissue are liable to gouty inflammation: we may particularise aponeuroses of muscles; the sclerotica; cartilages of the nose, eyelids, and ears; ligaments, other than those of joints; the periosteum, and probably the tunica albuginea of the testicle. Morgagni relates an instance of acute gouty ophthalmia in his own person, and we have seen a case of the same kind. In both the ophthalmia came on at the beginning of the attack, and its nature was inferred from its not running the usual course of common inflammation and from its immediate subsidence on the development of gout in the extremities. It has been remarked by a surgeon of eminence, that in persons afflicted with gout, operated on for cataract, gouty inflammation often attacks the eye and causes blindness, either by acute inflammation, with rapid effusion of lymph into the vitreous humour, or by the slower but equally destructive process of repeated inflammation of the sclerotica.† Gout affecting the whole surface of the forehead, temples, and eyelids, is not uncommon; the aponeurosis of the abdominal muslces is also sometimes its seat; and in some other cases the symptoms seem to refer to the tendinous centre of the diaphragm. But it is when gout attacks internal organs that it puts on a most alarming aspect, and becomes immediately dangerous to life. As in this case the gout of the extremities generally subsides rapidly when the internal affection begins, the term "retrocedent gout" has been adopted to express it. The stomach, or the stomach and intestines, are almost invariably the organs to which retrocession takes place: there are no well authenticated examples of transference of gout to the lungs; and instances of gout affecting the heart are few, and not described well enough to be conclusive. The most marked case we are acquainted with of gout affecting the heart is described by Dr. Haygarth in the *Medical Transactions*, vol. iv.

Apoplexy, or other symptoms of cerebral congestion, sometimes come on when gout is repelled by cold applications. Such cases are, however, rare; and we shall confine our further remarks to gout of the stomach and bowels. It has been already stated that in chronic gout a painful affection of the stomach sometimes alternates with that of the extremities. This affection is not inflammatory in character, nor, generally, dangerous to life; the pain attending it is like cramp or gastrodynia, and is usually relieved by pressure; the heat of the surface is rather below than above the natural standard, and there is seldom vomiting. But when affection of the stomach succeeds to well-marked acute gout of the extremities, in the height of a febrile paroxysm, the symptoms are much more alarming, and often tend rapidly to a fatal issue.

In such cases the pain is very severe; is usually attended with incessant vomiting or hiccough, and, when the bowels are affected, with profuse diarrhœa also. At first there is considerable fever; but if the symptoms are not relieved, collapse ensues early, and soon terminates in death. The early symptoms are therefore of an inflammatory kind, like those of the affection of which they have taken the place. It is of the highest importance to discriminate well between these two forms of gout in the stomach, because they require opposite plans of treatment. There can be no doubt that these internal affections are as specific in nature as the gout of external parts. We consider the following facts to be sufficient proofs of the truth of this proposition. The affections in question do not run the course of common inflammation, or of any

* Since this salt is an ingredient of healthy urine, there can be no doubt, from the reasoning in the text, that it exists also in healthy blood.

† We are indebted for this valuable remark to our friend Mr. Barnes of Exeter.

other simple form of disease: they alternate in a complete and remarkably sudden manner with gout of the extremities, and if we can succeed in fixing the latter, the internal affection is at once and permanently relieved.

Diagnosis. Rheumatism is the only disease which can be readily confounded with gout. Identity in the seat of the local affection is not the only point in which they resemble, and it often requires patient inquiry into the history of the disease, and accurate scrutiny of present symptoms, to enable us to distinguish between them. For lack of these precautions, gout is often mistaken for rheumatism by men of large experience, and we believe that it is by mistakes of this kind that colchicum maintains its undeserved reputation as a remedy for rheumatism. In a first fit of gout, the seat and limited nature of the local affection, the appearance of the part, and the other circumstances detailed in the description, are characteristics of sufficient peculiarity to preclude doubt about the nature of the malady: it is not here that the difficulty lies, but in more advanced cases, when numerous joints are simultaneously affected. In such cases the history of former attacks is of much assistance, as may be seen from the statement already quoted from Sir C. Scudamore, that in 190 of 198 cases gout was limited, in the first fit, to the joints of the feet and ankles: such a limitation never occurs in rheumatism. The age of the individual is a circumstance of less extensive bearing, for although gout never occurs in childhood, and rheumatism often does, yet, as we have elsewhere shown, adult and mature age are, much more than infancy, exposed to the latter disease. Much stress has been laid on the statement, that gout comes on without obvious cause, and that rheumatism may always be assigned to an evident one; namely, exposure to cold. But the paroxysm of gout may often be attributed to the same cause, while in many cases of acute rheumatism the operation of any obvious cause altogether escapes the notice of the patient.

But the symptoms of gout, narrowly observed, will be found to differ considerably from those of rheumatism. Œdema of the affected parts, and desquamation of the cuticle, we have already adverted to in the description of gout: they do not always exist, but, when both are present, they may almost be considered pathognomonic of gout. Sir C. Scudamore makes the following statement in regard to desquamation:—"In 98 cases in whom I have examined this point, I find that 25 have never experienced this symptom: not more than 6 of the 73 invariably, and many of them in some fits and not in others; and in no instance, I believe, except from the hands and feet."

Œdema is much more general, and is, we believe, present at some period in the course of every fit. In acute rheumatism, œdema is rare; and, when it does exist, is not nearly so marked as in gout. This is therefore a character of considerable value. In gout the variation from day to day, in the degree of fever, is much greater than in acute rheumatism; passing, in the course of few hours, from the highest degree of febrile excitement to complete apyrexia, and this to be followed as suddenly by return of fever. We know of no other single circumstance which marks so well the distinction between these two diseases. In rheumatism, when pain is severe and fever considerable, there is always profuse sweating; in gout, sweating is often absent, and, when present, is very much less abundant than in rheumatism. Something also may be gathered from the nature of the pain, which is more agonising and more deep-seated in gout. In cases of gout, where only one or two joints are affected at a time, this limitation of itself excludes difficulty. Chronic gout being generally a sequel of acute gout, and occurring when fits of the latter have been both frequent and protracted, the history of the disease elucidates its nature. Occasionally however, and especially in persons of a weak constitution, and in women, chronic gout is primitive. A careful scrutiny of the history of the malady generally suffices to establish a diagnosis; but local signs are not wanting. In chronic gout there is often not more than one joint affected, never many at a time; and the affected parts generally exhibit œdema in a remarkable degree. The reverse of these circumstances are observed in rheu-

matism. The hands and feet are also more exclusively subject to chronic gout than to rheumatism: bursæ, synovial capsules, and sheaths of tendons, may be distended with fluid in either.

We have not referred to syphilitic affections of the bones: to confound these with gout can happen to those only whose ignorance is exceeded by their negligence.

Pathology. In the foregoing description we have made known various important lesions which affect ligamentous and tendinous structures and contiguous synovial capsules. We have seen that the principal morbid change appreciable in the living subject is effusion of fluid into these capsules, and into the cellular tissue adjacent to tendons and ligaments; and that this effusion of fluid is generally attended with acute pain, swelling, local redness, and much febrile excitement; circumstances which point out the inflammatory nature of the affection. On the other hand, the hereditary succession of gout, its spontaneous accession and repetition, prove it a constitutional disease; while the course and products of the local inflammation further prove that inflammation to be specific in kind. The formation of gouty concretions has already been described at some length. On dissection they are found to occupy the cavities of joints and bursæ, the substance of tendons, and the cellular tissue adjacent to ligaments; in the latter situation the lithate of soda is deposited in separate cells, and not in a cyst. The manner in which the concretions are, as it were, impacted in the tissue of tendons, suggested to Musgrave the expression, — "Tophi in tendinibus tanquam clavi trabibus impacti, non raro observantur." We have remarked that the material of these concretions is fluid when first effused, and that it becomes solid by absorption of the liquid parts. The cartilages covering the condyles of the femur and heads of various bones are often coated with a thin layer of lithate of soda of the purest white, and of the consistence of very soft plaster, there being at the same time no similar deposit on any other surface within the joint. When this substance has acquired a considerable degree of hardness, the cartilages become absorbed, and the new surface sometimes exhibits grooves which seem the effect of friction. In such cases the functions of the joint are permanently injured; sometimes anchylosis follows; but if the deposit be very considerable (as in joints of the fingers), dislocation is the more common result. These effects are most frequent in joints of the hands and feet, for the plain reason that these are more subject to gout than others; but concretions have been found on the pericranium, cartilages of the ear, and in many other situations. When the irritation of a concretion has caused ulceration, very large quantities of lithate of soda continue to be secreted from the surface of the cavity after entire separation of the concretion. It has been stated that these concretions are formed of lithate of soda; a small proportion of phosphate of lime is always present; and M. Cruveilhier has published the analysis of a concretion, in which the proportion of phosphate of lime was greater than that of lithate of soda. (*Anat. Path.* liv. iv.) Effusion of lithate of soda, in quantity to form obvious or palpable masses, is of rare occurrence in gout, and happens only after numerous and protracted fits. Sir C. Scudamore states, that in 206 cases of gout he did not discover any trace of concretions in more than 21, — a proportion rather above one in ten; but as he does not mention in what degree the subjects of these cases had suffered from gout, no valuable inference can be drawn from the statement. We certainly should not infer, from the rareness of concretions, that effusion of lithate of soda is of rare occurrence in gout. That this substance is often poured out in quantity so small as to elude detection in the living subject, dissection has amply proved; and, on the other hand, while it remains in a fluid state, there is no physiological obstacle to its absorption, — an event which would render concretions of palpable size comparatively rare. The effusion of lithate of soda in various parts is a circumstance so peculiar to gout, and is in many cases so obviously an essential part of the disease, that there can be no doubt of its being an im-

portant element in all. But we have seen that it is also common for gouty persons to pass an excess of lithates in their urine, in the intervals of gouty paroxysms; and that these persons are more liable than others to gravel and calculus of lithic acid origin. However we may abstain from raising a theory of the proximate cause of gout on the foundation of these facts, yet we must consider the discharge from the blood, at various outlets, of so large a quantity of such a highly animalised principle, as a fact of paramount interest in the pathology of gout, especially when viewed in connection with those habits of life which we shall hereafter show to be a main cause of gouty diathesis.

Having already shown that the lithates are not formed by the act of secretion, but merely separated from the blood, the discharge of them in such large quantity in gout (especially during the paroxysm) proves that in this disease the blood must be charged with great excess of them, and further shows that the paroxysm is, in one sense, a depurating process. Such vitiation of the blood with excess of lithates must tend to injure the functions of many organs; and when we reflect on the removal of ailments, which usually follows the elimination of these principles in the paroxysm, we do not outstep the bounds of cautious inference in considering accumulation of them in the blood as the probable cause of those various and anomalous ailments which often precede the paroxysm, and as intimately connected with the cause of regular gout itself. As in some other febrile diseases there must also be excess of lithates in the blood (as proved by elimination of them in unusual quantity), it is probable that the cause of gout is the presence, in that fluid, of some kindred but more specific principle. It may be objected to these views, that a full paroxysm sometimes comes on without precursory symptoms; but to this it may be answered, that in diseases of which contamination of the blood is the sole cause, precursory symptoms occur in some cases, and not in others, although such contamination exist a considerable time before the development of the disease. That gout sometimes follows local injury is no objection, for the fact that this is not constant, implies a predisposition.

We now proceed with the anatomical characters. The muscular tissue is never primitively affected with gout. When a joint has been a long time anchylosed, the muscles which formerly moved it dwindle for want of use; and the texture of muscles may suffer much damage in consequence of repeated gouty inflammation of their aponeuroses. Ligaments and tendons lose much of their elasticity through frequent attacks of gout, and often remain habitually sore. Gout very seldom causes suppuration; we have never seen an example of it. Sir C. Scudamore states that he has seen it in four cases, and, in all, the result was curiously modified by attendant secretion of lithate of soda. Pathological anatomy has done nothing for gout of the viscera; no effects of gout on the pericardium, or on the internal membrane of the heart, are recorded. Gouty inflammation of the stomach is not questionable, and is often fatal; yet we possess no good description of its morbid anatomy. We have examined after death but one case of this affection. The appearances were peculiar and difficult to describe, and our notes of it are very imperfect. It would be interesting to ascertain whether there be, in these cases, effusion of lithate of soda into the cellular coat of the organ.

Almost every organ has been named by authors as the occasional seat of gout, and every ailment of gouty persons has been attributed to this Proteus. It is almost needless to add, that much which has been written on this subject is extremely fanciful, and has not been submitted to the test of a sound pathology. What are the viscera that are liable to gouty inflammation, is not yet determined; although it is obvious that the functions of all may suffer from that contamination of the blood which is probably the most important element of the gouty diathesis. Gouty inflammation of the kidney has been described with some appearance of truth; it is yet, however, matter of doubt, whether the symptoms of this affection should be referred to gouty inflammation, or to such modification of the urinary secretion as is most likely

to result from the gouty diathesis. For a very full account of the inflictions, real and supposed, of anomalous gout, the reader is referred to Stole (*Dissertatio de Arthritide*), Musgrave (*De Arthritide Anomalâ*), and to the *Dictionnaire des Sc. Médicales*, art. GOUTTE.

Causes. The circumstance of being the offspring of gouty parents is of great influence in predisposing to gout. Sir C. Scudamore (from whose elaborate treatise we must here borrow largely) found, that of 189 patients taken indiscriminately, there were 105 whose father or mother, or both, were subject to gout; the remaining 84 were born of parents free from gout, and not allied to it by family. Now, if the children of gouty persons were not more subject to gout than those of persons not gouty, 105 to 84 would express the proportion which the former class bear to the latter; but it must be evident to every one, that even in that class of life in which gout is most frequent, gouty persons are a small minority,—a fact which, contrasted with the numbers 105 to 84, showing the proportion of cases of hereditary to those of acquired gout, demonstrates the vast influence of hereditary predisposition. This is also further shown by particular examples, of which many striking ones might be adduced.

Sir C. Scudamore has related some curious instances, in which nearly all the members of a family have suffered from gout, although the parents and other relatives were entirely free from it. He states, that in one family, three brothers and a sister, out of six children, have been severely affected; and that in another, also consisting of six, four brothers have suffered from very aggravated gout, and the two sisters only have escaped. In these examples the disorder was not known in the two preceding generations. These facts are deserving of notice.

The immunity from gout enjoyed by women is very notorious. We shall see that this is probably merely the expression of a more general fact, namely, that persons of temperate habits are, with few exceptions, exempt from this disease. Menstruation, and the natural temperament of women — much less sanguineous than that of men—may also have some share in procuring this happy immunity.

Examples of gout occurring before puberty are exceedingly rare, and the few which have been cited do not appear to be well authenticated. Gout is, indeed, rare before the age of thirty. Sir C. Scudamore has noted the period of first attack in 209 cases.

It occurred before the age of 20			in 4 persons only.
—	between the ages of 20 and 30	—	63 persons
—	— 30 — 40	—	78
—	— 40 — 50	—	43
—	— 50 — 60	—	16
—	— 60 — 70	—	5
			209

Bearing in mind that the number of persons in existence decreases rapidly as age increases, the very great liability to gout in persons between the ages of 30 and 40 becomes obvious. Persons between 40 and 50 are, probably, quite as liable to the accession of gout as those between 20 and 30. After 50, the liability decreases rapidly, but even persons between 60 and 70 are very much more liable to have gout come on, than those under 20. Sir C. Scudamore has not met with gout coming on, for the first time, after the age of 66. Thus it appears that gout usually comes on soon after the growth of the body is completed, and while the function of nutrition is yet in full vigour. Authors seem to have no doubt that a particular form of body predisposes to gout, and some have described the "gouty form" with great minuteness. No one, however, has determined the proportion of persons of such form to those of different shape, and therefore speculations upon it are without value. The opinion that sexual indulgence is a cause of gout is probably still more fanciful.

Habits of life furnish the most important considerations connected with our subject, for we shall see that, without the co-operation of causes arising in certain habits of life, all the circumstances hitherto enumerated remain without power to produce gout. Several influential circumstances prevail in the mode of life of gouty persons; namely, high feeding, especially great consumption of animal food, habitual abuse of spirituous liquors, and sedentary habits. The first two are more constant and undoubtedly more influential than the last, which may be considered of a more negative character. These several circumstances appear in a stronger light when contrasted with the habits of a class who may be said to be entirely exempt from gout; we allude to agricultural labourers: these men are, from necessity, sparing in the use of animal food, habitually temperate, and all day long work hard in the fields. During a long and extensive professional connection with a large rural district, we never knew an instance of gout among agricultural labourers, who of course form the great mass of the population; gout was not uncommon among tradesmen, but still more frequent in the class of gentlemen and opulent farmers.

That the quantity of animal food consumed by agricultural labourers is comparatively very small, must be well known to persons who have lived in the country; and we believe this circumstance has considerable share in procuring for that class their signal exemption from gout. It is nearly established that large consumption of animal food tends to produce the lithic acid diathesis; a condition so often associated with gout, that more than one author has been led to consider these forms of disease as essentially connected. In advancing the opinion that large consumption of animal food is a cause of gout, we are glad to avail ourselves of the support of one of the most distinguished physiologists of our day. Müller, in commenting on Magendie's experiments on food, says, "These experiments have thrown some light on the causes and mode of treatment of gout and calculous disorders. The subjects of these diseases are generally persons who live well, and eat largely of animal food: most urinary calculi, gravelly deposits, the gouty concretions, and the perspiration of gouty persons, contain abundance of uric acid; a substance into which nitrogen enters in large proportion. By diminishing the proportion of azotised substances in the food, the gout and gravelly deposits may be prevented." An elderly country practitioner has assured us, that, forty years ago, gout was much more frequent among farmers and tradesmen than at present: he is of opinion that men in these classes drank more freely then than now, and to this difference he ascribes the greater prevalence of gout at the period referred to. This greater prevalence of gout formerly has been averred to us by so many of credit and observation, that we have no doubt of its reality. Allowing that free drinking was more common in those times, we must also remark the important fact, that vegetables were scarce and dear, and that meat formed a much larger proportion of food than at present.*

Abuse of malt liquors and wine is so commonly associated with the love of good cheer generally, that it is difficult to form a separate estimate of its influence as a cause of gout. This influence is real and probably considerable, and we are disposed to think that malt liquors tend, even more than wine, to produce a gouty diathesis. Their effects are especially manifest in those ex-

* We have before us an account-book bearing date from the middle to the latter end of the last century, and in it we find some interesting entries of the comparative prices of meat and vegetables. The prices for a long period run as follows: — *Quarter of a sheep*, two shillings; peck of potatoes, sixpence. In the same district, at present, potatoes are often only threepence a peck, whereas mutton is sixpence a pound, and sometimes more. The gentleman who gave us this account-book, and who is now more than seventy years old, informs us, that when he was young, no potatoes were kept for winter use, and that the only other sort of garden stuff used was a coarse kind of kale, the leaves of which were stripped off the stalk, and prepared for the table by plain boiling. This vegetable was tough and unpalatable; and during four or five winter months the food consisted, almost exclusively, of meat, bread, and flour puddings. The change which extensive cultivation of the potato and diffusion of gardening has wrought in the nature of the food of the population generally, is remarkably great, and well deserves the attention of physicians. (See SCURVY.)

amples of gout which occur in the lower classes. There is a body of men employed on the Thames whose occupation it is to raise ballast from the bottom of the river. As this can be done only when tide is ebbing, their hours of labour are regulated by that circumstance, and vary through every period of night and day. They work under great exposure to inclemencies of weather; their occupation requires great bodily exertion, occasioning profuse sweating and much exhaustion. In consideration of this, their allowance of liquor is very large; each man drinks from two to three gallons of porter daily, and generally a considerable quantity of spirit besides. This immoderate consumption of liquors forms the only exception, as far as relates to food, which these men offer to the general habits of the lower classes in London. Gout is remarkably frequent among them, and although not a numerous body, many of them are every year admitted to the Seamen's Hospital Ship affected with that disease. This is a very interesting fact, and seems to show that no amount of bodily exertion is adequate to counteract the influence of such large doses of porter; the exposure of ballasters to wet and changes of temperature probably favours its operation. These men are almost all derived from the peasantry of Ireland; they can rarely, therefore, inherit a disposition to gout.

All the tradesmen we have met with affected with gout, have been known to us for their intemperate habits, and especially their abuse of malt liquors; a very large proportion were innkeepers.

The abuse of wine has been considered in all times one of the most efficient causes of gouty diathesis, and there is ample reason to confide in the truth of this opinion. Wine probably acts in the same way as malt liquors: the strongest wines, such as port and madeira, are considered to be the most powerful in producing a disposition to gout; while, on the other hand, it is supposed, that in persons who have had gout, sour and light wines, especially champagne and claret, more readily bring on the gouty paroxysm. We shall see that in the quality of an exciting cause, the abuse of wine holds the foremost rank, and this probably first led to its recognition as a general cause of gout.

The effects of spirits cannot well be separately treated of: it seems probable, that when drunk exclusively they do not powerfully predispose to gout: gouty patients assure us they are much more safe from their enemy in the habitual use of gin and water, than when taking an equivalent of wine or malt liquors.

We have endeavoured to estimate the influence exercised by abuse of liquors separately from that of other indulgences of the palate. In reality, however, they are generally found together; and in habitual indulgence in the pleasures of the table, considered in their aggregate as constituting good cheer, we see a cause more prevalent than any other,—a cause recognised by physicians in very early times, and undisputed in our own. No truth is established on a surer foundation than this; that habitual indulgence in pleasures of the table brings on gout, and abstemiousness, temperance, and active habits preserve from it. The fact is striking, and is well exemplified by the almost complete immunity of females, and, as we have said before, by the total exemption of agricultural labourers and young persons. We do not, however, mean to stigmatise all gouty persons as intemperate. We have already amply shown the influence of hereditary predisposition, and this may be so strong that gout may come on without the co-operation of indulgences which can be accounted culpable. Of this, our own experience furnishes many instances.

Great bodily exercise, by producing expenditure of power, by rendering assimilation more perfect and excretion more complete, sanctions the use of a large quantity of food, and may even counteract the ill effects of occasional excesses at table: sedentary habits, on the contrary, do not furnish any one of these motives for a large supply of food, and, by inducing repletion, probably favour the operation of those causes which we have just been considering. The discovery that many excrementitious principles are not formed in the organs through which they are discharged, but exist already in the blood

(probably as a residue of assimilation), has given additional interest to the functions of excretion, and has shown the importance, in regard to the purity of that fluid, of promoting these by appropriate habits. The skin has important functions of this kind, and in transpiration and sweating offers an outlet to highly animalised excrementitious principles; — a still larger portion passes off by the kidney. The efficacy of bodily exercise in promoting the proper discharge of these functions is well known; and it seems probable that to this quality more than to the prevention of plethora, may be ascribed its success as a means of protection from gout.

We now come to treat of *exciting* causes. The most common of these are indulgence in pleasures of the table, and especially abuse of wine or spirituous liquors; the use of stimulant mineral waters; local violence, such as a bruise or sprain, or violent exercise of a part; exposure to cold and moisture; and when the gouty diathesis is rife, any circumstance which excites fever or in any way disturbs the health of the patient: in this way excess in venery may possibly be an exciting cause of a paroxysm, but it is in nowise a cause of the gouty diathesis. As striking examples of the immediate effects of abuse of wine, Sir C. Scudamore gives the case of a person, neither descended from gouty parents, nor having reason to expect such a disease, who, after three or four days of excessive conviviality, in which he drank champagne very freely, was seized severely with the gout. In another individual, of a temperament bordering on the pure sanguineous, with a circular chest and large veins, not born of gouty parents, after committing the extraordinary excess of drinking four bottles of port wine at a sitting, was seized the same night, and for the first time, with the gout. Three persons sat down to a convivial dinner with scarcely the sensation of gout, but on rising to depart, the feet were completely disabled by the inflammation and swelling, which had made rapid progress. (*Treatise on Gout*, pp. 101, 102.)

In the last century, when a fit of gout was considered a cure for every ailment, and the doctrine had become popular, because it countenanced the most cherished habits of good livers, physicians had very extensive experience of the effects of mineral waters as an exciting cause of gout: they all agree in ascribing considerable power to their use, and the waters of Bath, in particular, acquired great celebrity.

A gouty paroxysm is frequently the consequence of severe local injury; but, in advanced cases, unusual exertion in walking is often sufficient to excite a paroxysm. One of our patients has been visited with a severe fit of gout in several successive years, manifestly excited by considerable exertion in the pursuit of his favourite diversion, partridge shooting.

The influence which local violence, long previously sustained, has in determining the seat of gout, is interesting. We are acquainted with a gentleman, who, when young, sprained his ankle severely; many years afterwards he experienced his first attack of gout; that part only was affected then, as well as in the two or three following fits.

Sir C. Scudamore relates a similar instance, and another still more interesting, of a gentleman, who, when a youth, accidentally received some small shots from a gun in one knee. They were removed, but the knee was rendered permanently weak in a slight degree; and to this part the gout in after life first attached itself, and always afterwards with more severity than in any other situation. In scurvy, also, facts exactly analogous to these are observed; a circumstance which imparts to them additional interest for the pathologist.

Gouty persons are remarkably sensible to the influence of cold and damp: we know many who invariably suffer twinges of gout after the slightest dampness of the feet, and even a full gouty paroxsym is often excited by this cause. We shall not pursue further the enumeration of exciting causes: when the gouty diathesis is confirmed, any, even trifling, disturbance of the system, from whatever cause it arise, may occasion the development of a paroxysm.

Treatment. The treatment of gout has been, and continues to be, subject to much caprice and prejudice. Many persons, having once found their health improved by a severe attack of gout, are led to consider the paroxysm exclusively in the light of a salutary process, which it would be unwise or even unsafe to interfere with; others go still further, and, believing the relief to the system to be proportionate to the violence of the paroxysm, endeavour to promote the development of gout by local warmth and an exciting regimen. But improved health is by no means a constant result of the gouty paroxysm; while, on the other hand, the lamentable disorganisation of joints which ensues when severe fits of gout are repeatedly allowed to take their own course, is a peremptory motive for the interference of our art. The great advantage of judicious medical treatment in severe attacks of gout is now fully recognised by the Profession, and persons who suffer from gout are daily becoming more sensible of it. The first fit of gout is usually so slight an illness, and tends so early to a favourable termination, that little interference is necessary, and indeed medical aid is seldom sought for; when, however, the first fit is unusually severe, or gives indication of becoming protracted, those means should be employed which we shall now describe as applicable to a severe paroxysm in a more advanced stage of the disease. When acute gout comes on in a person of full habit, and is attended with much fever and urgent local symptoms, direct depletion affords great relief, and cannot safely be dispensed with. In such circumstances, general bleeding should be had recourse to; but it should be borne in mind that the object of bleeding is not to cut short the paroxysm, an effect to which it is inadequate, but to moderate fever, lessen the severity of local symptoms, and diminish repletion. These important effects may be attained by a prudent use of the lancet, and if nothing further be attempted, no bad consequences need be apprehended; but profuse bloodletting, repeated without due regard to the resources of the patient, is a practice fraught with danger and bad consequences.* Purgatives are of great service in the treatment, and no form of these is so eligible as blue pill, followed at the end of some hours by a common black draught. When the complexion and other appearances bespeak a bilious condition of the system, these medicines should be repeated several times at proper intervals: this treatment, in alliance with low diet and the use of diluents, materially alleviates the symptoms of gout, but is insufficient to accomplish a speedy cure:—fortunately, however, this may be safely completed by preparations of colchicum. The efficacy of this medicine in the cure of gout was known to the Greeks and Arabians; and the Hermodactyl mentioned by Greek authors, and extolled as a remedy for gout by Alexander of Tralles, a city of Lydia, in the sixth century, has been ascertained to be the colchicum. In our own times there has been much difference of opinion as to the efficacy of this medicine; for, while all have acknowledged its power, when first employed, to remove speedily the local symptoms, many have argued that the cure thus obtained is not permanent, but is followed by early and frequent relapses, and that in a short time the drug seems to lose all control over the course of the disease. Notwithstanding this impeachment of its virtues, colchicum has continued to advance in favour as a remedy for gout, and counts among its advocates the best and latest writers on the subject, among whom we may mention Scudamore, Halford, and Barlow. Sir H. Halford states that he has never known a single instance of untoward effect from its use, and affirms that gout does not return more quickly after its use, than when treated by other means or left to its own course. As far as we have observed, it is only when colchicum is used to the exclusion of other means, without observance of proper diet, and left off on the first subsidence of local symptoms, that gout returns more quickly after its use. In persons of very full habit, in the height of a febrile paroxysm, direct depletion ac-

* There is some reason to believe that the old doctrine, that profuse bleeding favours metastasis to vital organs, is true as regards gout; and that this effect is one, though not the only, source of danger arising from such practice.

complishes what cannot be affected by other means, and it ought not, therefore, to be superseded. It is certainly not by depletion that colchicum cures gout.

When the fever and local symptoms are not urgent, and especially when direct depletion is for some reason inadmissible, we may have recourse to colchicum in the first instance. The cure obtained by it will be speedy in most cases, and, if the remedy be long enough continued, as permanent as if effected by any other means. We shall now make a few remarks on the usual physiological effects of colchicum, as these effects will be found to suggest some important rules for its use. When the wine of the root is given in large doses, it occasions violent vomiting and purging; the stools are copious, watery, and attended with much griping; the vomiting recurs at short intervals, and there is much nausea and sense of load at the stomach, ith distressing faintness and sinking. In some cases there is marked diminution in the frequency of the pulse, which is also faltering and occasionally intermittent. We have frequently observed these distressing symptoms in persons ill of acute rheumatism, and taking ʒss of the wine three times a day. In smaller doses, colchicum acts as diuretic, and promotes perspiration; it sometimes purges moderately, but rarely produces diminution in the frequency of the pulse. In a long series of careful observations on the subject, we never remarked material diminution in the frequency of the pulse, except in connection with the more violent effects already described; and we believe the effects of colchicum on the pulse have been much overrated. From these observations it appears, that the caution to be observed in the employment of this medicine regards chiefly its effects on the stomach and bowels, as it seems probable that, if allowed to produce violent irritation there, gouty inflammation might thereby be determined to these organs. We have knowledge of one instance in which this seemed the result, and the issue was fatal. The most striking symptoms in that case were, uncontrollable vomiting and purging, followed by early and profound collapse. When, therefore, distressing nausea or violent purging supervenes, colchicum should be left off until these effects have ceased. On returning to its use, it will be prudent to employ a smaller dose than before. We also approve of Sir H. Halford's precept,—that in the common circumstances of gout in the extremities, colchicum should not be used at first, but that we should wait a day or two until the malady shall have fixed itself. We need scarcely add, that the presence of symptoms of gout in the stomach entirely contravenes the use of colchicum by the mouth, and that profuse diarrhœa is also a counter-indication.* It has been argued by many, and very forcibly by the late Dr. Sutton, that colchicum cures gout by its purgative effects; but this statement is disproved by the experience of all who have much employed this medicine, for it often cures without producing sensible increase in any of the excretions, and, according to our own experience, its beneficial effects are quite as soon shown under these as under any other circumstances. On these grounds, we do not see why Dr. Barlow and Sir C. Scudamore should have denied to colchicum a specific action. The wine of the root of colchicum is as good a preparation as any; twenty-five drops, twice a day, in cinnamon water, may be given at first, and if this agree with the patient, may be increased to thirty. We have never found it necessary to carry the dose beyond this. When there is acidity in the stomach, fifteen grains of carbonate of magnesia may be given with each dose, and is indeed always a safe and perhaps good addition. These doses of colchicum generally produce moderate purging and increased secretion of urine; effects which must undoubtedly be considered salutary. Under this treatment the local symptoms

* It seems to us, however, that it is eminently desirable, even in these cases, to introduce colchicum into the system by some means or other. In case the stomach were affected, and diarrhœa not present, we should be much disposed to try the effect of colchicum in enemata. In cases attended with vomiting and purging, administration of veratria by the endermic method is well worth trying, for in such cases the means in present use so commonly fail, that it is incumbent upon us to try any that give fair promise of success.

soon abate, fever subsides, and the general condition of the patient rapidly improves; often, in a few days, convalescence is fully established. But it is necessary to continue the medicine for many days after entire cessation of symptoms; the doses may, however, be diminished, and the intervals between them lengthened. We have learned from experience the great importance of this rule, and it is explained by those views on the pathology of gout, which show that removal of the local symptoms and attendant fever is far from equivalent to complete cure. This continuance in the use of colchicum is, moreover, never attended with ill effects. In cases in which the stomach is irritable, colchicum should be given at first in small doses, and its best vehicle is a common effervescing draught: when it has a tendency to purge too freely, this may be counteracted by the addition of a small quantity of tincture of opium to the evening dose.

Sir C. Scudamore prefers the Acetum Colchici to all other preparations. The following is the formula he recommends:—℞. Acetici Colchici, ʒj ad ʒij; Magnesiæ, gr xv ad xx; Magnesiæ Sulphatis, ʒi ad ʒij; Aquæ puræ, ℥ iss. Fiat haustus.

This draught to be given every four, six, or eight hours, according to the freedom of its operation and the urgency of the symptoms. Sir H. Halford recommends the wine of the root. He states that, so far from finding it prone to purge the body, as the eau médicinale often did, he generally finds it necessary to add a small portion of sulphate of magnesia.

The diet in acute gout must be much the same as in other febrile diseases. While there is much fever, the patient must be restricted to the use of diluents: rennet whey, toast and water, and weak tea, are generally relished. There is no objection to the moderate use of oranges, grapes, or roasted apples, provided there be no acidity of stomach, and they do not increase too much the purgative effects of colchicum.

The return to a more nourishing diet should be commenced with farinaceous food.

An attack of gout is, generally, so soon relieved by the means described, that there is no need of local treatment. Gout is also so shifting in character, that local treatment promises much less advantage than in simple inflammation We object therefore to the practice of applying leeches to the gouty limb, partly on the ground of its being needless. Those who have had the most experience of this practice in our own country state, that it often promptly relieves the affected part, but that it produces great and lasting weakness of the joint, and that the relief of the extremity not unfrequently seems the occasion of gouty inflammation of the stomach, or some other important organ. The application of leeches may, however, be sanctioned by unusual continuance of violent inflammation, in spite of judicious general treatment. We have employed them in a few instances, and in these they soon relieved the local affection without producing untoward consequences. It is proper to state that local bleeding is much extolled by many French authors of good repute.

It is, we believe, sufficient in all cases merely to cover lightly the gouty part, and relieve it from the weight of bed-clothes. The prevalent custom of wrapping it in flannel is very pernicious; the unnatural heat of the part is thereby increased, and much relaxation and weakness result from the copious local transpiration it occasions. We have had no experience of the method of local evaporation, so strongly recommended by Sir C. Scudamore; but as he states that it has given signal relief in 130 cases in which he has tried it, and not once produced any unpleasant effects, we give an account of his method for the use of those who may be disposed to try it. It consists in applying to the gouty part linen rags wet with a lotion (luke-warm), composed of one part alcohol and three parts camphor mixture. The linen compresses, constantly kept wet with the lotion, should consist of six or eight distinct folds, one laid upon another; and the lightest and coolest covering only used in addition. When the lotion is discontinued, the part should be wrapped in a

single layer of flannel. The best method of applying the lotion to the knee and elbow is in a bread poultice saturated with it, and laid on thick and luke-warm.

We cannot warn our readers too strongly against the irrational and dangerous practice of repelling gout by immersing the affected parts in cold water.

In the convalescence of gout, the diet should be light and simple, and the bowels kept regular by the use of a mild warm purgative. Exercise of the parts which have been affected should be attempted gradually: its measure will, in general, be best indicated by the feelings of the patient, who should however be warned against the danger of excess, which almost certainly brings on a relapse. Moderate exercise should not be too long deferred, as, by promoting the absorption of effusions, it tends more quickly than any other means to remove stiffness and weakness. When capsular effusions persist, moderate friction with the hand is very beneficial: a well-applied bandage is also of great use, especially when there is œdema. The patient should be very cautious of early exposure to cold.

In chronic gout, the treatment must of course be much less active. Direct depletion is very injurious, as in this form of the disease,—generally the sequel of acute gout,—there is usually much constitutional debility. This may have proceeded so far as to furnish the leading indication of treatment: the countenance may be blanched, the tongue pale and indented, the pulse weak, the breathing short on the slightest exercise, and the heart palpitating. In such cases the affection of the joints has a much less inflammatory character than in acute gout, is more wandering, and often alternates with pains of the stomach like gastrodynia, and anomalous pains of the head and other parts. In these circumstances, tonic medicines and generous diet are of the greatest service. Preparations of iron are generally to be preferred to other tonics, and tincture of muriate of iron is an eligible form: its object may be promoted by the daily use of two or three glasses of good sherry. The good effects of Bath waters in this form of gout (the atonic or anomalous gout of authors) in some measure justify the high reputation in which they were once held. In acute gout these waters are invariably injurious. Under the treatment just described, it generally happens that the body is invigorated, the internal parts are relieved, and gout settles in the extremities, assuming a more frankly inflammatory character. When this desirable object is attained, the remedies may be more specially directed to its cure, and preparations of colchicum, given with the precautions already enjoined, produce admirable effects: in cases of this kind we have found camphor mixture an excellent vehicle. In chronic gout, unattended with much debility, our chief reliance is to be placed on colchicum, which should be continued for some time after apparent cure is accomplished.

If the secretion of bile be defective, or the complexion sallow, blue pill followed by a mild purgative draught should be occasionally given. The diet too must consist chiefly of farinaceous food: a small portion of wine may be advisable when the patient has been accustomed to take it freely.

In protracted chronic gout, where the joints are very stiff and weak, the gouty diathesis confirmed, and the health much broken, the use of mineral waters is sometimes remarkably successful: the relief from local stiffness and weakness is, in particular, very striking when thermal waters are used locally by affusion and in the form of warm baths. The waters of Aix-la-Chapelle, of Wiesbaden, and of Carlsbad, enjoy great reputation.

The presence of gouty concretions may require some modification of the usual local treatment: on this point we shall again quote the excellent paper of Mr. James Moore:—"The shocking appearance of a severe fit of gout when it attacks a part in which there is an accumulation of chalk has already been noticed. In this situation a warm poultice is a far better application than dry wool or flannel. If there is any tendency to gangrene, the poultices ought to be of the cordial kind, into the composition of which porter, wine, or opium,

should enter. If the cutis opens, yet leaves the chalky effusion confined by the cuticle only, a puncture should be made. It is imprudent to touch with a lancet the organised cutis, or even to make a large opening into the cuticle to expose parts in so precarious a state. Even a small puncture will permit some portion of the fluids to escape, and more will run out in the poultice. The tension is then removed, and the symptoms commonly improve. After the violence of the fit has subsided, an ulcer frequently remains with chalk in the bottom, which renders it extremely difficult to be healed. It is bad practice to attempt to remove the chalk by the knife, for a wound might occasion a renewal of gout, or at least a great deal of inflammation; and as the chalk is a solid substance, and dispersed in separate cells, very little could be removed by the incision. Caustics employed with caution answer better. We may add, that when gangrene does take place, the yeast poultice is the best application that can be used."

In retrocedent gout, the relief of the suffering organ must be attempted by remedies which affect it primarily, and by others which tend to recall the gouty inflammation to the extremities. The means best calculated to attain the latter object are hot stimulating pediluvias or sinapisms, or both. Those which may be employed to fulfil the former, must vary in some measure with the organ which suffers, and with the degree and character of the symptoms. When these are of an inflammatory kind, as happens when they have succeeded to acute and well-marked inflammatory gout of the extremities, those measures must be adopted which are known to be most efficacious in quelling common inflammation of the suffering organ. When the stomach is affected, and the symptoms are of the kind referred to, local bleeding must be freely employed; and if there be much pain, and incessant vomiting, as generally happens, opium must be given in full doses, and an effervescing draught is its best vehicle. In such cases we object to the use of more direct stimulants, unless there be alarming collapse. In the gouty affection of the stomach, which often alternates with that of the joints in chronic gout, and which is remarkably painful, and of the character of gastrodynia, stimulants are invariably successful. We have given, with uniform advantage in these cases, an ounce of tincture of rhubarb in one dose, allowing at the same time a pretty free use of brandy and water. But in all cases of retrocedent gout, in which the symptoms are urgent, it is right to attempt to recall the gout to the extremities by suitable means, before adopting more vigorous measures, since if we succeed, in the first instance, the relief to the internal parts will be complete, and the patient will be spared much painful and hazardous discipline.

Prevention. We have seen that the chief causes of gout, setting aside hereditary disposition, are free living and sedentary habits; it follows, therefore, that the surest means of prevention are temperance and active exercise. When hereditary tendency is present, temperance especially should be strictly observed, and a preponderance of vegetables in the habitual food is also advisable. In short, those threatened with gout should imitate, as far as practicable and consistent with comfort, the habits of agricultural labourers. The application of these principles must be rigidly enforced when the occurrence of an attack of gout has already declared the existence of gouty diathesis. Field sports furnish admirable exercise for the higher classes, and are advisable in all cases in which gout has not injured the structure, or impaired the functions, of joints. Perseverance in temperate and active habits will often wholly preserve from further attacks; but if it fail in this, still their frequency will be lessened, and severity much diminished. Much less can be done by the use of medicines. When, however, premonitory symptoms appear in persons who have had gout, the impending paroxysm often seems averted by a dose of blue pill followed by a mild draught of sulphate of magnesia and senna, and the observance of a low diet for a few days. We have seen this a great number of times in one of our patients, when the symptoms of impending gout have been of the most characteristic kind. Sir H. Halford states, that in regard to

medicine he has had "incomparably the most satisfaction in giving a few grains of rhubarb and double the quantity of carbonate of magnesia every day, either at bedtime or early in the morning; or, under evident weakness of the powers of digestion, half an ounce of compound tincture of rhubarb with fifteen grains of the carbonate of potash in some light bitter infusion daily, before the principal meal."

When the joints have been crippled by repeated and prolonged attacks, little can be done in the way of prevention, especially as exercise is impracticable, and the gouty diathesis deeply rooted. Here a warm climate seems to promise more advantage than any thing else. Haller and Van Swieten relate striking examples of success obtained by a few years' residence in the West Indies. Rome is a good European residence for gouty persons; and Sir J. Clarke states, that Genoa is remarkable for the rare occurrence of the disease among its inhabitants. In the cases referred to, we strongly object to the practice of entirely withholding wine or other stimulants from persons who have been long accustomed to their use. The prospect of benefit to the gout from this practice is very uncertain; and it will be found that the patient is afterwards constantly ailing, and deprived of all comfort, if, indeed, no worse consequences ensue. Where indulgence in wine has been excessive, the supply of it may be restricted with advantage.*

* Since this article was written, Dr. Holland's admirable volume of *Medical Notes and Reflections* has fallen into our hands. In the chapter on gout and colchicum, we were much pleased to see developed with great ability, views similar to many advanced in this article, especially as regards the nature of gout, and the use of colchicum. The reader will find, in Dr. Holland's chapter, some ingenious and valuable speculations on the hereditary succession of gout; on wine, as a cause of the disease; and on the operation of colchicum as a remedy.

WORMS FOUND IN THE HUMAN BODY.

Parasites. — Origin of worms. — Causes. — Seat. — Symptoms, local and constitutional. — Morbid appearances caused by worms. — General treatment. — Classification of worms. — Particular species. — Acephalocystis endogena. — Acephalocystis multifida. — Echinococcus hominis. — Cysticercus cellulosæ. — Animalcula echinococci. — Diplosoma crenata. — Tænia solium. — Bothriocephalus latus. — Distoma hepaticum. — Polystoma pinguicola. — Trichina spiralis. — Filaria Medinensis. — Filaria oculi. — Filaria bronchialis. — Tricocephalus dispar. — Spiroptera hominis. — Dactylius aculeatus. — Strongylus gigas. — Ascaris lumbricoides. — Ascaris vermicularis. —

It would appear to be a principle in the economy of Nature, to which perhaps few exceptions will be found, that every species of animal, either during life or after death, shall be subject to the depredations of some other species.

The final purpose to be served by such a law, in providing for the removal of dead animal bodies by the reconversion of their decomposable materials into living structures, appears to be of a twofold nature: first, to prevent the injurious consequences which would result to living species from the extrication of noxious gases accompanying chemical decomposition; and secondly, which is of far higher importance, to provide a supply of matter already organised, and therefore capable of being more readily assimilated to the textures of those animals which are destined to feed upon it; for by this means the organic particles of decomposing animal bodies are rescued, as it were, in their transitorial stage, and brought back again to life before opportunity is afforded for them, in the ordinary course of chemical decomposition, to pass over to the mineral kingdom.

But the occupancy of living bodies by parasites presents us with a more remarkable and less understood feature in the law of predation, one indeed for which it is difficult to find a satisfactory explanation, unless we regard it as a provision, by which the stronger and generally more highly organised species are destined to afford protection and nutriment to the weaker; a provision which, while it in some measure tends to counterbalance the more ordinary rule of the weaker yielding to the stronger, at the same time contributes to fulfil another recognised principle of Nature, that "every situation which is capable of supporting living beings shall be peopled with them."

But whatever may be the final cause, it is an admitted fact, that almost every species of animal is liable to be infested by its peculiar parasite or parasites, which are developed in and protected by its various textures, and draw their sustenance from its juices, while man is so far from constituting an exception to the general rule, as to be subject to a greater number of parasites than any other living being.

Some of these are limited to the surface of the body, and cause but slight inconvenience; others penetrate the skin, and produce more or less irritation; while the greater number occupy the internal parts, and give rise to symptoms varying in character and intensity, according to the nature and position of the parasite.

The frequency with which these parasites occur, and the variety of disorders which accompany their presence in the human body, demand for this subject the attention of every medical practitioner. It is not however our intention to describe every species of parasite which has been discovered in or upon the human body. The external parasites require little or no attention from the practitioner; while of the internal, many, such as the larvæ of numerous insects, are of only occasional occurrence, and their presence must be considered accidental. But it is to those genera and species whose fixed and frequent occurrence in the human body entitles them to be considered as the peculiar parasites

of man, that our observations will be mainly directed, still however not excluding others, which, though of rare occurrence, nevertheless are clearly entitled to be associated with them.

These internal parasites, to which the term *Entozoa*, or the more familiar one of *Worms*, has been generally applied, we propose to treat of under the following sub-divisional heads: 1. the origin, causes, and seat of worms; 2. the symptoms and morbid changes which accompany their presence; 3. their treatment; 4. their classification; and lastly, under the head of each separate genus or species, will be given such particulars in relation to their characters, structure, symptoms, and treatment, as may appear most conducive to a practical knowledge of the subject.

Origin of worms. This is a point upon which much difference of opinion is found to exist among helminthologists, for while some adduce the entozoa as presenting examples of spontaneous or equivocal generation, others contend for their external origin in all cases, while others maintain a somewhat intermediate position, and, allowing the origin of the entozoa in distinct ova, contend that these are transmitted from the parent to the fœtus in utero, through the medium of the circulation. It would not accord with the objects of a practical work to enter at any length upon a question involving so much speculation; but a few of the more important points, which have been advanced, may be noticed. Those who contend for an internal origin, whether by spontaneous production, or by the development of transmitted ova, consider that this view is supported by the fact, that while the number of known entozoa is very great, yet that each species is for the most part limited to particular animals, and appears in no others, thus presenting an uniformity in this respect, which it would be difficult to reconcile with the notion of a promiscuous external origin. That the structure of the entozoa is such as renders them fit to inhabit only such situations as the bodies of the animals in which they are found; that their frequent existence in various structures of the body, having no external communication whatever, negatives the idea of an outward source; and that their occasional occurrence in the unborn fœtus must remain equally unexplained, unless either their internal or spontaneous origin be admitted.

On the other hand is to be noticed the singular fact, that many of the entozoa are remarkable for the great development of the reproductive organs, many possessing distinct sexes, and most of them true ova, which it is not difficult to imagine would become developed in those situations and those only which would afford them an appropriate nidus, while no purpose would appear to be answered by the possession of an extensive generative system in an animal capable of spontaneous development. The singular fact also, that individuals visiting particular countries may become infested by the species of entozoa peculiar to that country, has been repeatedly ascertained, and must be regarded as militating greatly against the idea of any other origin than an external one, at least in those particular instances.

Some of these contending views might perhaps be reconciled by a more strict limitation, or particularisation, of the objects to which the general argument has been applied; for the class entozoa contains animals, which in many instances may be said to possess little or no character in common beyond the mere circumstance of their inhabiting the bodies of others. Some have well developed and distinct organs for nutrition and reproduction; others consist of a more solid parenchyma, in which these parts are as it were but sketched out in a rudimental form; while others again, still more simple in structure, consist only of a granular membrane, in which it is impossible to trace any of the structures possessed by the higher classes. With so great a variety of form and organisation, it may well be supposed that there exists a corresponding difference in the mode of reproduction of the entozoa, sufficient to account for their presence in the various parts of animal bodies in which they are found, without having recourse to the idea of a spontaneous origin.

All those for example which are found in the alimentary canal may be supposed to have been introduced in the form of ova, which required only a suitable nidus for their development; and their subsequent multiplication there is easily effected, whether their ova be the product of separate sexes on the same individual as in *tænia*, or in different ones as in *ascaris*. Nor can the possibility of an external origin be altogether denied to worms inhabiting any organ having an external outlet, though remote, such as the urinary or even gall-bladder. The subject becomes more obscure when we regard the occupancy of parts having no external communication, such as the cavity of the eye, or the muscular or cellular texture, and that also by worms of considerable size.

It seems to us, however, that all these cases may be reduced to two conditions. We may suppose that there has been either a penetration of these parts from without by the parasites, or that their ova or germs, under whatever form, have circulated with the blood, and afterwards escaping from the general course of that fluid, have been deposited in the remote situations in which they are found.

In a subsequent part of this essay will be given evidences in favour of this power of certain species to penetrate textures. In the case indeed of the Guinea-worm, the evidence in favour of this power of penetrating to the cellular texture from without is so strong, as to have led many observers to adopt a thorough conviction of its external origin, and some even to believe in the possibility of its being communicated by contagion; and until these evidences can be set aside, there appears to be no difficulty in allowing an external origin to worms inhabiting even the globe of the eye, or similar positions.

On the other hand, in the case of those parasites which occupy positions that are clearly unattainable in this mode, they will be found to consist chiefly of those lowly organised genera, of whose mode of propagation, and of the nature of whose germs we know but little, and which are therefore not calculated to throw much light upon this question either way; or, as in the case of the minute *trichina spiralis*, the ova may fairly be supposed to be so small as to present no difficulty in reference to the notion of their circulating with the blood. It is not however so much our object to enter into the merits of an unsettled question in physiology, as it is to draw attention to those points, by a more extended examination of which it may be expected that the question will be ultimately set at rest.

Causes. The circumstances which favour the production of worms, no less than their direct origin, are involved in much obscurity. It would appear from the perfect adaptation of the entozoa to the peculiar situations in the bodies of the animals which they inhabit, that they are as much indigenous, so to speak, to those situations, as particular plants are to the particular districts or countries in which they are found; and that their germs, be they of whatever nature, are equally dependent for their development upon certain external conditions, as are the seeds of a plant upon the nature of the climate, or the quality of the soil from which they spring. This analogy, indeed, would not inaptly furnish us with a guide to the investigation of the circumstances which favour the production of the entozoa, in so much as relates to locality, climate, season, and the like influences, as well as in considering the nature of the nidus and pabulum which are most favourable to their development and growth.

With regard to the influence of locality and district, it has been distinctly ascertained that certain species are found in certain districts only, and in no others, but that individuals visiting those districts are as liable to be infested by these particular worms as the native inhabitants, and may carry them away to other parts. This is the case, for example, with the Guinea-worm, which is not uncommonly found in certain parts of Africa and Asia within the tropics, and where the European resident becomes equally liable to it with the native inhabitants. It would even seem to prevail occasionally in an epidemic form, as appears from the account given by Sir James M'Grigor of the 86th and 88th

regiments while resident at Bombay. The first of these regiments had continued quite free from the disease until the monsoon set in, when no less than 300 of the men were attacked by it; and, still more remarkably, the second, that replaced the first, and which after remaining two months at Bombay embarked, and were attacked while at sea to such an extent, that nearly half the men became affected.

The *tænia* and *bothriocephalus* also afford another striking example of the effect of climate, or district, in the localisation of species. These two forms of tape-worm nearly resemble each other in general conformation, but differ in certain particulars, which will be subsequently noticed. The *bothriocephalus latus*, however, is met with only in Switzerland, Poland, and Russia; while in England, France, Holland, and Germany, the *tænia solium* alone prevails; and in those parts of France which border upon Switzerland the inhabitants are infested by both forms.

With regard to season and climate, as influencing the production of worms, there appears to be a pretty general belief, that a moist or damp atmosphere is favourable to the production of worms. If this be true, their greater frequency in Holland and Switzerland might be explained by reference to the humid atmosphere of those parts; and this accords with the observations that, in many of the fenny parts of England, the residents are much troubled with the *ascaris vermicularis*. Certain it is that, in many animals, the development of worms can be distinctly traced to the influence of these causes, as in the case of sheep, which invariably become the prey of parasites if placed in too damp a pasturage; and the ancient observation of Hippocrates, that worms are more prevalent in autumn than at other seasons, might meet with a similar explanation.

So far then the production of worms in the human body appears to be influenced to a certain extent by the remote operation of climate, season, and locality. But the enquiry becomes the more interesting when we attempt to trace their origin to less remote causes. When we come to enquire how far their presence may be accounted for by reference to the nature of the food taken into the bodies of those animals upon which they are parasitic; and how far their well being in those situations most favourable to their development and growth is to be accounted for by reference, on the one hand, to a pre-existing favouring condition of the parent body, or, on the other, to a state of constitution which, while it is that which is the most appropriate to the parasites, may have been in a great measure, if not solely, induced by its presence.

In reference to the first point, that is, the dependence of parasites upon the nature of the ingesta, it is clear that if we regard the origin of worms as in all cases external to the body, we should herein find the clue to their introduction in most cases at least; while it will be observed, that the subject loses all its practical interest in that view of it which attributes the origin of worms to a spontaneous production of them within the bodies of the animals which they inhabit; for so long as we believe in their external origin, we shall be naturally led to investigate the sources from which they may be supposed to be derived, and to seek the means of preventing their introduction. But it is to be regretted that none but very general observations have been made upon this point. Where the food taken is of such a nature as to be readily digested, and no more chyle is produced than is readily absorbed, there appears to be but little chance of the development of worms; but the food being of an improper nature, and the powers of digestion inadequate to its due concoction, that state of the alimentary canal is induced which, from the imperfect absorption of the chyle and the too abundant secretion of mucus, is the most favourable to the nutrition of the parasites. Hence the observation of Rudolphi, that children who eat voraciously of coarse bread and potatoes, and similar articles of food, are more liable to worms than those whose digestive organs are less oppressed. Hence Mr. Annesley observed that the Hindoos, who live almost entirely upon rice, are so infested with worms, that not more than one in ten is free from

them; whilst, in some parts, the combination of certain condiments with the daily food appears to be so essential to the prevention of worms, as to have given rise to that ancient law in Holland, which enacted as a punishment, that criminals should be obliged to eat bread without salt, in order that their bodies might become infested with worms.

The second point of enquiry proposed with reference to the immediate cause of worms, namely, how far their development in the body may depend upon a pre-existent favouring condition of constitution, affords one of the most difficult questions in helminthology. It appears, indeed, almost impossible to say, in any given case where worms are known to exist, and where their presence is accompanied by constitutional derangement, how far that state of constitution might have preceded the existence of the parasites; or, on the other hand, to what extent it may have been caused by them. Common observation shows that the presence of worms is, in most cases, associated with a debilitated state of constitution, though they occasionally exist in the robust and healthy: but the amount of their dependency upon such a state of constitution, or, on the other hand, the share which they may have had in inducing it, is not easily determined.

The general law which has been attempted to be laid down, that parasites do not appear until the powers of the constitution are reduced to a certain standard, which is supposed to be favourable to their development, is liable to so many obvious exceptions, as not, perhaps, to be of great value in physiology, at the same time it is that which every practitioner will bear in mind with advantage, since it is the one which will lead him to the most successful practice. For though, in many cases, no more may be required than the simple administration of medicines calculated to remove the parasites, yet the coexistence, frequently, of a state of debility or cachexia, appears so obviously favourable to their recurrence, as to leave no doubt of the necessity of combining constitutional with local treatment. Nor can the obvious connection of worms with a certain state of constitution be overlooked in reference to the fact, that age appears to have a great influence over their development, since in infants at the breast, and in adults, they are much more rare than in children in whom the tendency to their formation appears to be strong up to a certain age, generally the period of puberty, after which the habit of producing them appears spontaneously to cease.

Seat of worms. In reviewing the parasites of the human body and the various textures which they inhabit, it becomes difficult to fix upon any organ that may not afford a nidus for some one or more of them; for with the exception of the more solid parts, few appear exempt from their influence. Each organ or texture, however, seems to have its peculiar parasite, which is also in most instances limited to that organ. The following table will show the textures usually infested, and the species by which they are inhabited:—

Small intestines -	*Ascaris lumbricoides.* *Tænia solium.* *Bothriocephalus latus*
Large intestines -	*Trichocephalus dispar.*
Rectum - -	*Ascaris vermicularis.*
Urinary bladder -	*Diplosoma crenata.* *Spiroptera hominis.* *Dactylius aculeatus.*
Gall bladder - -	*Distoma hepaticum.*
Kidney - -	*Strongylus gigas.*
Eye - -	*Filaria oculi.*
Liver - -	*Acephalocystis endogena.* *Echinococcus hominis.*
Spleen and omentum -	*Echinococcus hominis.*
Ovary - -	*Polystoma pinguicola.*

Bronchial glands	-	*Filaria bronchialis.*
Muscle	- -	*Trichina spiralis.* *Cysticercus cellulosæ.*
Brain	- -	*Acephalocystis multifida.*
Cellular texture	-	*Filaria Medinensis.*

Symptoms. Under this head it is intended to mention only those symptoms which are caused by worms in general, as contra-distinguished from those which are peculiar to each species, and which will be subsequently noticed in conjunction with the description of those species.

For convenience of description, the symptoms caused by worms may be divided into the *local* and the *constitutional*, though it may be difficult to draw an exact line between these two.

The local symptoms vary according to the particular seat of the worms, the nature of the organ they inhabit, and the degree of impairment to its functions caused by the presence of the worms. The body may be infested by thousands of worms, and yet no symptoms whatever, either local or general, manifest themselves, so as to lead to any suspicion of their existence. This is the case with the *trichina spiralis*, whose seat is the muscular system. The *trichina* is generally found in such numbers as to defy all attempts at computation; yet their presence does not appear in the least degree to impair the functions of the texture through which they are scattered, nor was the presence of this worm in any of the cases on record even suspected during life. This circumstance may probably be explained by reference to the minute size of the entozoon, and also to the comparatively less importance of the muscular system in the animal economy.

Where the worms are larger, and the parts which they inhabit more immediately concerned in the vital functions, the local disturbance is proportionally greater. Thus the brain and the liver each exhibit symptoms of the disturbance to their functions, when they become the seat of parasites. But it is more particularly in the case of worms inhabiting the intestinal canal, that we may expect to find evidences of their existence from symptoms especially referrible to those parts. Pain in the abdomen like that of colic, and situated chiefly near the navel, is often complained of, though pain is by no means an invariable symptom of worms. Some indeed appear seldom to cause pain, as the tape-worm, which on account of the softness of its texture could hardly be expected to give rise to any very definite sensations, except such as might arise from its great length and bulk, interfering with the movements of the intestines. The *ascaris lumbricoides* more frequently causes pain, probably on account of its greater power of motion and firmer texture, and from the circumstance also of the body terminating in somewhat sharp extremities. The sensations however of gnawing, piercing, or creeping, thus produced, are by no means constant, and not peculiar to worms, as they have frequently led to a suspicion of their existence where none certainly were present. The symptoms become more marked when the worms find their way to either extremities of the canal, as when the *ascaris lumbricoides* gets into the stomach and excites vomiting, or the *ascaris vermicularis* accumulates in or near the rectum, and gives rise to the intolerable itching which characterises in a great measure the presence of that species. The irritation thus caused, however, is frequently propagated to a distance along the alimentary canal, so that not only is the rectum or anus the seat of these distressing sensations, but the opposite extremity appears equally to sympathise; hence the frequent picking of the nose and lips, causing these parts to swell and often to bleed violently; the grinding of the teeth especially in sleep, and similar marks of irritation.

The functions of the bowels are seldom properly performed. The evacuations are unnatural in quality and quantity, and there is generally either a costive or relaxed condition of body: these states frequently alternate with each other. The evacuations themselves sometimes consist almost entirely of

mucus, which by some is considered to be produced by the irritation of the worms in the intestinal tract, and by others to be the very cause of their existence there. This mucus is generally more abundant at the times when the worms are passed, and the evacuations are then occasionally tinged with blood. More frequently, however, it may be said, that the stools present no unusual or characteristic appearance. Much, however, will depend upon the extent to which the digestive powers may have been impaired, for where the stomach is weak, the food is often passed in half-digested masses, or appears but little altered, and the evacuations become extremely offensive from the decomposition of the alimentary matters and the accumulation of unhealthy secretions. When this is the case, there is generally also considerable swelling of the belly, chiefly caused by accumulation of flatus in the bowels. The appetite is impaired, or more often voracious, so that a much larger quantity of food is taken than can be digested. The tongue is often white and loaded, the breath heavy or fetid, and there is often an increased flow of saliva, with a disposition to sickness, or actual vomiting.

The symptoms which indicate a disturbed state of constitution, more remotely connected with the presence of worms in the alimentary canal, are so varied, that it is difficult to class them. The primary disorder of the digestive organs is often accompanied by a corresponding disturbance in other functions; and these remote influences are perhaps most frequently manifested in a disordered condition of the cerebral system, as manifested in the frequent occurrence of headach and giddiness, with ringing in the ears, disturbed sleep, with grinding of the teeth and sudden waking alarm; and the prevalence of somnolency, indolence, or ill-temper. The symptoms have, in some instances, run so high as to cause the case to be mistaken for one of hydrocephalus; but the pain in the head, dilated pupil, convulsions, and other signs imitating the true disease, have suddenly subsided on the removal of the exciting cause. These cases however must not be confounded with those in which hydrocephalus and worms are coexistent, constituting a combination of not unfrequent occurrence, especially in scrofulous children.

Chorea appears to be a not infrequent concomitant of worms in the intestines, though the degree of dependency of the disease upon their presence is not always easily ascertained; for it may be argued, that the subsidence of the disease on the removal of the worms might be more fairly attributed to the evacuation of the faulty secretions and the restoration of the parts to a more healthy condition. The spasmodic affection has sometimes assumed the more severe form of epilepsy, of which Bremser and others have related examples, though doubtless some of the cases related may have been more dependent upon the circumstances just noticed than upon the mere presence of the worms. The cases in which, however, these morbid conditions are the most unequivocally connected with the existence of worms are those in which the symptoms have suddenly disappeared after their expulsion, and when various plans of treatment, short of effecting this, have failed, as in a striking case, related by Dr. Suck, in which a young girl had been suffering from a violent spasmodic affection of the eyes, to which furious delirium and convulsions succeeded, and who was cured on the expulsion of a large number of worms, but not until after various purgative and vermifuge medicines had been used without effect. More rarely, trismus, tetanus, and hysteria, and various affections of the senses, as temporary deafness and amaurosis, have appeared capable of being traced to the existence of intestinal worms; and we have the authority of Hoffman for stating that aphonia may be produced by a like cause, the voice being suddenly recovered upon the expulsion of the worms. The same author considers worms as capable of inducing temporary mental alienation.

A disordered condition of the circulation is also an occasional attendant on the presence of worms in the intestines. The pulse is often feeble, and the general circulation languid, giving rise to coldness of the surface, especially of the extremities, accompanied by palpitation of the heart. In these cases the coun-

tenance is pallid and sallow, the eyes sunken, and surrounded by a livid circle. Occasionally there appears a temporary excitement of the circulation, constituting what has been denominated worm fever, which however is generally observed in scrofulous habits, and assumes the form of hectic, and hence may be considered rather as a concomitant of that particular state of constitution, than as having any immediate connection with the existence of worms. When the digestive functions have been long impaired, the loss of balance between lymphatic and lacteal absorption becomes strongly manifested in the general atrophy which ensues. The adipose and muscular tissues are gradually wasted, and the dwindled limbs strongly contrast with the tumid and hard belly so frequently met with in scrofulous children.

The intimate connection of pulmonary affections with a disordered condition of the alimentary canal, which so frequently comes under the notice of the practitioner, receives a striking illustration in the case of worms. Numerous cases might be cited in which not only has the sympathetic connection between gastric or intestinal irritation and pulmonic disorder been manifested in the comparatively slighter forms of dry cough and dyspnœa, as attendant upon worms, but some more severe affections have been noticed, such as pulmonary hæmorrhage, of which examples have been given by Mr. Rumsey in his observations on the coincidence of hæmoptysis with worms in the intestines. (*Med. Chir Trans.* vol. ix.)

Morbid appearances caused by worms. The worms which inhabit the intestinal tract appear to be capable of inducing but very slight organic changes in the textures with which they come immediately in contact. For the most part their presence there is accompanied only by a greater or less accumulation of mucus, with some increased vascularity of adjacent textures; but even these appearances are often wanting. The soft texture indeed of these parasites is such as is not likely to produce any very marked changes in the adjacent textures by causing serious injury to these parts; and even those worms which may be found adherent by their suctorious mouths to the mucous membrane, as the *tænia* and *bothriocephalus*, do not appear to excite much vascular action, except perhaps in the immediate spot to which they are attached. Both Bremser and Rudolphi doubt whether the *ascaris lumbricoides* ever cause any amount of irritation in the intestines. They never observed them adherent to the mucous membrane, but always loose, and generally enveloped in mucus, by which they are as it were insulated from the surface of the bowels, and thus prevented from exciting inflammation. One species however, the *trichocephalus dispar*, appears occasionally to produce injury to the intestines, as in a case met with by Mr. Joshua Brooks (noticed in the fourth volume of the museum catalogue of the Royal College of Surgeons), in which the worms were found in a living state upon and in the cæcum, which was perforated, as it were, by a number of pin holes. A considerable portion of the internal coat was eroded. (*Hunt. Mus. Gall.* prep. 173. A.)

The power of worms to penetrate into the abdominal cavity by perforating the healthy coats of the intestine in the human subject has been asserted, but is denied by Wickmann, Bianchi, Rudolphi, Bremser, and others, who consider that all the cases on record of worms found in the peritoneal cavity after death may be explained on the supposition that they had escaped by ulcerated openings in the gut, or had been allowed to pass in by apertures caused by the sloughing of strangulated intestine. That worms do occasionally perforate the intestinal walls, so as to escape into the peritoneal cavity in certain animals, as fishes, birds, and some mammals, is beyond dispute This is the case with the *ecchinorhynchus* for instance, whose armed proboscis seems to render it fully capable of such performance; but it is difficult to understand how the *ascaris lumbricoides* with its simple suctorious mouth could penetrate the healthy intestines of man; nevertheless, the two following cases by M. Gaultier de Claubry may be quoted as having been advanced in favour of such an idea. In a girl seven years old, who died of convulsions in six days, he found eleven of these worms in the

general cavity of the belly, and the coats of the stomach perforated with holes, in some of which other worms were sticking. In another child of the same age, who died in seven days of convulsions, he found thirty-six worms in the peritoneal sac, a great mass of them in the stomach, and twenty-seven of them making their way through holes in its coats. (*Nouv. Journ. de Med.* ii. 266.) In these cases it is quite possible that the worms had escaped after death, in consequence of post mortem softening of the coats of the stomach.

In the following instance, however, it is probable that the worm escaped during life, though there is nothing to show that there had not pre-existed an ulcerated opening in the intestine by which the worm had escaped, the case therefore not differing from one of ordinary perforation of the gut and escape of its contents. A soldier in the Mauritius was seized with slight fever and severe pain, beginning at the pit of the stomach and gradually extending over the whole belly, which by the third day began to enlarge; bilious vomiting with costiveness and suppression of urine followed; the belly continued to increase, and the man died on the fourth day. On dissection several quarts of muddy fluid were found in the sac of the peritoneum, the viscera were agglutinated by lymph, a round worm was discovered among the intestines between the umbilicus and pubes, and the ileum exhibited a perforation six inches from the colon, corresponding in size with the worm. (*Med. Gaz.* vol. ii. p. 649.) In *Rust's Journal* the case of a woman also is mentioned, who after a tedious illness vomited several of these worms and was then seized with a painful swelling in the left side, which in course of time suppurated, and discharged along with purulent matter three other worms of the same kind. Here therefore it would appear that the worms had gradually made their way from the bowel to the surface of the body, by slowly exciting inflammation and suppuration with surrounding adhesion of parts, and so causing a cyst to be formed around the worms which subsequently opened externally.

This property of inducing so much irritation in the parts in contact with the entozoa as to cause the formation of a cyst around it, has been hardly ever observed in the case of worms inhabiting cavities which have external openings; but where the solid parenchyma of organs becomes the habitation of entozoa, then a cyst is generally formed, by which the worm is isolated from surrounding parts. This is the case when the liver, for example, becomes occupied by hydatids; a more or less dense albuminous or cartilaginous cyst is developed, in which the hydatids are contained, either singly or in great numbers. Even the minute *trichina spiralis* has been invariably found to be enveloped in a small cyst, in which the worm lies coiled up, and the walls of which are generally strengthened by a greater or less deposit of earthy materials in its interstitial texture.

General treatment. Under this head it will be convenient to point out the general principles which should constitute a guide in the management of cases of worms, and also to mention the principal medicines which have obtained reputation for their vermifuge properties, referring, however, to the description of the different species for particular plans of treatment appropriate to each. Some of the entozoa are necessarily not answerable to medical treatment, on account of their position, even could their existence be certainly ascertained; others occasionally require manual interference for their removal; while those only which occupy the alimentary canal may be considered as within the influence of remedial agents.

The indications to be fulfilled in the treatment of worms are of two distinct kinds, the one having reference simply to the expulsion of the parasites, and the other to the correcting of that state of constitution which appears most favourable to their development. Hence vermifuge medicines have been divided into the *evacuant* and the *corroborant*, according as they have been supposed capable of effecting one or other of these ends, and both these are included under the general head of *Anthelmintics.*

The *Evacuant anthelmintics*, or those which accomplish the expulsion of the

worms, may be again sub-divided into such as are simply *purgative*, and such as dislodge or destroy the worms by their *mechanical* action upon them.

Of these, the *purgative evacuants* are those in most frequent use. The object of their exhibition is to remove, not only the worms themselves, but also the superabundant mucus in which they are often lodged, at the same time that they assist in restoring the healthy secretion.

The purgatives may be either of the saline, oily, or drastic class, but in the employment of these some discrimination and caution must be used. Drastic purgatives are perhaps too commonly employed in the treatment of worms without due regard being had to the powers of constitution, and particular condition of the patient. Their frequent exhibition, if too long continued, is often attended by a degree of debility, which in itself will constitute one of the conditions apparently most favourable to the production of worms; and in all cases where there is much gastric or intestinal irritation, the drastic class of purgatives should be carefully avoided.

Those in most frequent use are scammony, gamboge, aloes, colocynth, and calomel, which may be given singly or in combination. Their exhibition also, in a large dose and at intervals, is more likely to accomplish the object intended, than when smaller quantities are more frequently exhibited; and in some children, especially those of strong constitution, it is necessary to follow up this plan with great perseverance. The combinations with calomel are exceedingly useful by preventing the secretion of bile, and thus assisting in clearing away the superabundant mucus which lodges in the intestines. The saline purgatives are not usually much employed, but of these the sulphate of potash and common salt or sea water are considered the most efficacious. The oily purgatives, on the other hand, are deservedly in great repute—castor oil, croton oil, and even the olive and other bland oils in large quantity, but especially oil of turpentine, which, for the expulsion of *teniæ*, constitutes one of our best anthelmintics, acting both as a poison to the worm, and also as an evacuant.

The *mechanical evacuants* have by some authors been much lauded, but their powers appear to have been overrated, and some have been proposed which certainly could not be exhibited with safety. Of mechanical evacuants, the two which have acquired the greatest reputation are cowhage and pulverised tin, zinc, or iron. Cowhage, or the hairs of the pod of *mucuna pruriens*, has long been reputed as a vermifuge, and though now not much used in this country, appears to be still often administered in the West Indies. The pods are dipped in syrup to entangle the hairs upon their surface, which are then scraped off, and formed into an electuary, of which a tea-spoonful or more is given daily for three successive days, followed by a brisk purgative. This remedy appears most useful in expelling the thread-worms, upon which it is considered to act mechanically, the sharp spines entering their delicate skins, and causing them to quit their position, their expulsion being afterwards effected by cathartics.

As a mechanical means, the powder of tin appears to act in a similar way. This is a more ancient remedy; at least it is mentioned by Paracelsus, though it does not appear to have been much used until it came to be generally introduced about a century ago by Dr. Alston, who prescribed it in doses of from half an ounce to an ounce mixed with treacle, followed by a purgative, which generally brought away the worms. These large doses, however, appear to have been abandoned, not more than from a scruple to a drachm being given for a dose three or four times a day, and followed by a purgative; neither this however, nor the former remedy, are now much employed in this country. Several other substances, which have obtained more or less repute, appear to act by irritating or destroying the worms. Turpentine has been already mentioned, which acts both as a purgative and also by poisoning the worms, as appears from their being expelled dead in almost every instance when this has been given. Dipple's animal oil and Chabert's oil appear to act in the same way, as probably do also the following—oil of juniper, essence of bergamot, camphor, tobacco, sulphuretted hydrogen and sulphuret of tin, valerian, assafœ-

tida, garlic, bark of Geoffroya inermis, bark of pomegranate root, and root of male shield fern, together with certain bitters, as wormwood, tansy, chamomile, &c.

It would not be difficult to extend the list of *specifics*, which have been proposed for worms, almost *ad infinitum*; and it may be doubted how far some of those just enumerated act as a direct poison to them, while it may be contended that the bitters act also as tonics by restoring the tone of the digestive organs, and thus might, with more propriety, be arranged under the second class of remedies, namely,

Corroborant anthelmintics. It has been stated, that while the first object in the treatment of worms is to effect their expulsion by the exhibition of such remedies as either act destructively upon them, or expel them living, the second and almost equally important end is to prevent their recurrence by restoring the powers of the constitution when there may have been, as they often are, impaired. For this purpose chalybeates have been preferred to any other form of tonics; and their exhibition must be guided, not so much by reference to any precise mode of practice, as upon the general rules which would direct the practitioner in the exhibition of tonic medicines. When the stomach will bear it, we have found the carbonate of iron given in drachm doses mixed with treacle, twice or thrice daily, one of the most useful forms. In other cases, especially in females and delicate children, the milder preparations often prove more advantageous, as the potassio-tartrate of iron in half drachm doses in solution, or the wine of iron. The Mistura Ferri and the sulphate of iron are preferred by many practitioners; the former especially appears to restore red blood rapidly, and is a very efficient remedy. But when all these have failed, and it is often necessary to try each in succession, we have found great advantage from the exhibition of the Liq. Ferri Superacetat. (prepared by Messrs. Drew and Heyward) in doses of five to ten minims, three times a day. The Tinct. Ferri Sesquichloridi will be occasionally found a useful form, particularly in females; or the natural chalybeate waters may be used, according to circumstances.

In those constitutions which will not bear the exhibition of steel, and especially in scrofulous children, the combination of powdered bark with carbonate of soda, in doses of five grains each, given twice or thrice daily, will often prove extremely serviceable.

The necessity of a strict attention to diet, and the exclusion of all unwholesome and indigestible articles of food, where this is possible, need hardly be insisted on; but among the children of the poor, in whom it will perhaps be generally admitted that worms are the most frequently found, the practitioner will of necessity encounter great difficulties upon this point.

Classification of Worms.

No natural arrangement of the animal kingdom could ever comprehend such a class as the *entozoa* (ἐντὸς, *intus*; ζῶον, *animal*); for the animals which have been thus indiscriminately grouped together, possess but one character in common, which is derived from the circumstance of their inhabiting the bodies of other animals. Beyond this single point of similarity in habits and localisation, they have no claim to be considered as a natural group; for they differ widely from each other both in organisation and form: while on the other hand, many of the species so closely resemble others that are not of parasitic habits, but are found in totally different situations, as clearly to show, that the setting apart of a group of animals merely from the circumstance of similarity in their predacious habits, while it constitutes an unnatural union of widely differing forms, must, at the same time, necessarily dissociate others which have the closest congeneric affinities.

This view of the subject is the necessary consequence of a more perfect knowledge of the organisation of the entozoa; and while for the sake of convenience we still class them together as a peculiar group of animals, we may at the same time with advantage subdivide them, in reference to their more natural affinities.

The following tabular arrangement presents such a subdivision. The entozoa of man are there arranged, according to their structural affinities, in three classes, which would again admit of further separation into orders. But since we have only to speak of the few entozoa which inhabit the body of man, no further division seems necessary. The locus, or peculiar habitat of each species, is subjoined to the generic and specific names.

I. ENTOZOA HOMINIS.*

Classis Psychodiaria (Bory St. Vincent).

Genus	1. Acephalocystis endogena	-	Liver, abdominal cavity
	2. Acephalocystis multifida	-	Brain.
	3. Echinococcus hominis	-	Liver, spleen, omentum.

Classis Sterelmintha (Owen).

4. Cysticercus cellulosæ	-	Muscle, brain, eye.
5. Animalcula echinococci	-	Liver, in the echinococcus.
6. Diplosoma crenata	-	Urinary bladder.
7. Tænia solium	-	Small intestines.
8. Bothriocephalus latus	-	Small intestines.
9. Distoma hepaticum	-	Gall-bladder.
10. Polystoma pinguicola	-	Ovary.

Classis Cœlelmintha (Owen).

11. Trichina spiralis	-	Muscle.
12. Filaria Medinensis	-	Cellular tissue.
13. Filaria oculi	-	Eye.
14. Filaria bronchialis	-	Bronchial gland.
15 Trichocephalus dispar	-	Cæcum, large intestine.
16. Spiroptera hominis	-	Urinary bladder.
17. Dactylius aculeatus	-	Urinary bladder.
18. Strongylus gigas	-	Kidney.
19. Ascaris lumbricoides	-	Small intestines.
20. Ascaris vermicularis	-	Rectum.

Class Psychodiaria.

This class includes the simplest forms of parasites with which we are acquainted; so little indeed do they possess of the character of true animals, that some physiologists have been led to question the propriety of placing them at all in the animal kingdom. Those which here require notice are well known under the familiar name of *hydatids*, of which they constitute the simplest kind. They consist of a globular bag in which is contained a transparent fluid; the parietes being formed by successive layers of opaque condensed albuminous matter. A power of growth by imbibition, and of reproduction by the development of buds from either the outer or inner surface of this animal bag, constitutes the only features which appear to give these products any title to be ranked in the same kingdom with the parasites of a higher grade, circumstances however in which they very nearly approximate to some of the lowest classes of vegetables.

1. *Acephalocystis* (*α, κεφαλὴ, caput; κύστις, vesica*) *endogena.* This was denominated by Hunter the pill-box hydatid, from the circumstance that the young are developed between the layers of the parent cyst, and gradually protrude like buds from the inner surface, until they become detached and float

* This classification is a slight modification of that of Mr. Owen, in the Cyclopædia of Anatomy and Physiology, vol. ii. p. 126. art. Entozoa.

about in its cavity, where they grow by the simple process of imbibition, and in turn produce other cysts from their interior. The term *endogena*, as expressive of this fact, is used to distinguish this species from the *acephalocystis exogena* of ruminant animals, which develop the young vesicles from its exterior surface. This form of hydatid presents no other kind of organisation or structure than that just described. It appears to be nourished by the imbibition of fluids, and the transmission of them into the interior through the membranous parietes.

This species of *acephalocyst* is by no means unfrequently met with in the human liver, where it will sometimes accumulate in immense quantities. It does not appear to injure the structure of that organ, for it is invariably found enveloped in an adventitious cyst, which forms no part of the animal itself, but appears to be thrown around it by the action of the vessels of the liver, with the object of isolating the parasite, and so preventing its interference with the functions of the organ, which, however, generally become deranged when the hydatids are very numerous. From the particular mode in which these animals multiply, it will be easily understood how a single cyst in the liver may contain a very large number of them; for as the parent cyst grows, successive cysts are perpetually forming in its interior, and these again giving rise to successive generations, until the primary cyst at length comes to contain many thousands of them. When the cyst in the liver becomes thus enlarged, it generally forms a prominent tumour, which points in the hypochondrium. And these cases have been occasionally tapped, where, on account of the great accumulation of fluid, the sensation of fluctuation was very distinct in the part; and by this means the cyst has been emptied of its contents, the smaller hydatids flowing through the canula, and the larger ones coming away in shreds.

The diagnosis of these cases cannot be made with any certainty, and the treatment of them does not differ from that usually adopted when the functions of the liver are otherwise deranged. When the fluctuation is very distinct, and other circumstances are favourable, tapping affords a fair prospect of relief. For this purpose a large canula should be used, that it may not be blocked up by the hydatids sticking in the tube, and thus retarding the evacuation of the cyst. It is surprising how large a cyst may be permanently emptied in this way. A woman between forty and fifty years of age was for more than two years a patient in St. Bartholomew's Hospital. During the earlier part of this time she was tapped repeatedly, and as much as from two to three gallons of fluid mixed with hydatids were drawn off at a time. This woman died of another disease, and on post mortem examination the structure of the liver was found perfectly natural, and the remains of the empty cyst which had contained the hydatids reduced to the size of a walnut: no other cysts could be found in the liver.

2. *Acephalocystis multifida.* This we have ventured to name as a new species, conceiving it to differ from the foregoing in some important particulars. We are not aware that it has ever been met with or described previously. The preparation from which this description is taken is in the pathological collection of Dr. Farre, and was brought over to this country from Barbadoes, by the late Dr. Jones, who, it is to be regretted, has left no record of the case. The subject of it however is known to have been a coloured man named Belgrave, who by his own exertions had amassed considerable property in Barbadoes, and who had been subject to fits. The preparation consists of that portion of the brain in which the hydatids were found. They are seen occupying an irregular cavity about an inch and a half in breadth and nearly three in length, which is situated in one hemisphere of the brain, and extends into the lateral ventricle of the same side. Each hydatid occupies a separate cyst, the walls of which are formed of a thin and delicate membrane; but as all the cysts are in close apposition, a coarse kind of cellular tissue is the result, within which the hydatids are contained. Several of the hydatids are perfectly globular and vary in diameter from a quarter to half an inch. Others present an appearance of small buds or

projections from the outer surface, which are contained in corresponding pits or depressions in the enveloping cyst, while others again have a true multifid character, consisting of several hydatids of an irregular pyriform shape, connected together by their elongated necks. Each of these however occupies a separate cell, the necks piercing the walls of the individual cells, and communicating with a common cyst, which may be supposed to have been the parent one. One of these groups of hydatids consisted of six united together. No structure whatever beyond that of a mere membrane could be discovered. There was no distinct head nor armature of any kind, but where the necks were joined the membranous parietes were continuous, thus constituting as it were a compound or ramified bag.

It would appear as if all the hydatids had been at first simply globular, but by a process of generation from the outer surface the little buds already mentioned arose, and forming corresponding pits or depressions in the walls of the containing cell, thus assumed a compound form; the little buds growing into larger vesicles, and the pits enlarging into separate cells to contain them.

3. *Echinococcus* (ἐχῖνος, *echinus;* κόκκος, *bacca*) *hominis.* This parasite, which closely resembles the preceding genus, is found in cysts in the liver, spleen, omentum, and mesentery. It consists like the former of a simple bag, which appears to be formed of two layers — an outer coriaceous one, and an inner transparent gelatinous tunic. To this inner coat are appended the singular bodies, termed the animalcules of the echinococcus, presently to be noticed, for which this genus is remarkable; and except in this particular it does not appear to differ from the simple acephalocyst.

Class Sterelmintha.

The class of solid or parenchymatous entozoa, *Sterelmintha* (ἕλμινς, *lumbricus;* στερεὸς, *solidus*), though more perfectly organised than the preceding, present nevertheless great simplicity of structure. They consist for the most part of a solid parenchymatous texture, in which are excavated, as it were, the canals or cavities which serve the purpose of digestion. They have no separate tegumentary system. They have but one opening to the alimentary canal, and the sexes are placed upon the same individual.

4. *Cysticercus* (κύστις, *vesica;* κέρκος, *cauda*) *cellulosa.* This parasite is not common in man, though very frequently met with in animals, especially in the hog, when it produces the state of muscles called measly pork. It occurs in the muscular system, but has been also found in the eye. The animal is always enveloped in an adventitious cyst formed apparently out of the interfascicular cellular tissue of the muscles condensed by adhesive inflammation. It differs in structure from the acephalocyst in the circumstance of its possessing an elongated neck terminating in a distinct and somewhat globular head. This head is armed by a small crown or double row of recurved spines, for the purpose of enabling the entozoon to pierce and fix itself to the soft parts in which it is found; while around this are placed four suctorious discs or true mouths, through which the nutriment is imbibed and carried into the dilated bag which constitutes the body of the animal. It is in the circumstance of these distinct traces of organisation about the head, that the *cysticercus* differs mainly from the *acephalocyst*, though both are confounded together under the common term of hydatid.

But few of our museums contain specimens of this entozoon; hence it must be considered as rare, though it appears to be more frequently met with on the continent. Rudolphi states that four or five examples occurred annually at the anatomical school at Berlin for several years. They have been most frequently met with in the glutæi, psoas, and iliacus internus muscle and in the extensors of the thigh.

Soemmering met with one instance in which it appeared in the anterior chamber of the eye, and a similar case is related by Mr. Logan, as having oc-

curred at the Glasgow Ophthalmic Infirmary. In the latter case, the child who was the subject of it had suffered for a considerable period with ophthalmia, after recovery from which the hydatid was observed. Its movements could be easily seen through the cornea, and as it continued to grow, inflammation was again set up. It was thought desirable to attempt the removal of the hydatid by incision through the cornea: in the attempt the hydatid was ruptured, and the remains of it extracted by the forceps. It was so delicate as scarcely to bear the slightest touch.

5. *Animalcula echinococci.* These animalcules are chiefly remarkable for the position in which they are found, being apparently the parasites of a parasite. They are found floating loosely in the cavity of the *echinococcus;* at least when the cyst is broken they float freely out, though from the nature of the armature about the head, it may be inferred that they have the power of attaching themselves to the walls of the cyst in which they are enveloped.

In a case related by Müller in which a cyst of this kind was passed with the urine, the animalcules which floated in the contained fluid of the cyst were found to present a circlet of hooks and four processes around the head. The posterior end of the body was obtuse. Some of the animalcules were enclosed in secondary cysts floating in the primary one; while others presented a sort of pedicle at their obtuse extremity, which had probably been a medium of attachment, and appeared to have been broken. Upon examining the body of a patient who died lately in the London Hospital, a large cavity was found in the liver, in which were contained from thirty to forty of these *echinococci.* Some of these were as small as a mustard seed; the largest about the size of a musket-ball. All however contained the animalcules, some with and some without cysts. The animalcules measured about the $\frac{1}{80}$ of an inch in length, and had the usual armature of spines about the head. It would appear therefore that the presence or absence of these animalcules constitutes the distinguishing feature between *echinococcus* and *acephalocystis*, a distinction, which for the purpose of classification it may be well, in the absence of more extended observation upon the relative connections of the enveloping cyst and its singular contents, to retain: for pathological purposes however the distinction is an unnecessary one.

6. *Diplosoma* (*διπλόος, duplus ; σῶμα, corpus*) *crenata.* This parasite has been confounded with *spiroptera hominis*, to which however it does not bear the slightest resemblance; but the confusion has arisen from the circumstance of both having been passed from the urinary bladder of the same individual, whose case also constitutes the only example on record of either of these parasites occurring in man. The particulars of this case are recorded by Mr. Lawrence, in the *Medico-Chirurgical Transactions*, vol. ii. The female who is still living in St. Sepulchre's workhouse, has been subject for a period of thirty-five years to retention of urine, accompanied by various distressing sensations referred to the bladder and kidneys, and requiring the daily use of the catheter. The passing of these worms dates from an early period in the history of the case, and appears to have commenced shortly after the introduction of a sound into the bladder, with a view to ascertain whether the symptoms were due to stone. It appears probable that the worms had been contained in a cyst in the bladder, which was ruptured by the instrument; as shortly after this event, they began to pass by the catheter, and the operation itself was attended by sensations on the part of the woman, which appeared to arise from the rupture of a cyst, and the liberation of worms into the bladder.

The worms thus passed were of two kinds; one of which will be here described, and which though long known, yet from the uncertainty which appears to attach to the precise nature of its organisation, and the doubts which some physiologists have cast upon its title to be ranked at all as an organised being, has not yet been described under any definite name. This deficiency therefore has now been supplied, from a firm conviction derived from the examination of numerous specimens, that the worm is a true entozoon, and therefore deserving to be so entitled.

This worm varies in length from four to six or eight inches, and is thinnest at the middle part, where it is bent at an acute angle upon itself, so that the two halves hang nearly parallel, and give to the entozoon an appearance as if two worms had been tied together by their heads.

At the point opposite the angle there is always found a rough surface, as if at this part there was a point of attachment which had been broken. From this central point the body gradually swells out towards the extremities, but contracts again within half an inch of the end, and terminates at one extremity in a tolerably sharp point, and at the other in a ragged end. The worm is solid throughout, consisting of a firm homogeneous texture of a white or yellow white colour. The upper surface is convex; the under is formed usually of two planes meeting at an obtuse angle, and leaving a longitudinal groove between them, in which is often found lodged a dark corneous concretion. Along the line of junction of the upper and under surfaces, there runs on the outer side a delicate membranous border, the edge of which is beautifully crenate, and upon examination with the microscope the crenatures themselves are seen to be also crenate. The worm is solid throughout, and has no trace of any internal organisation, except that of a delicate white line like a nerve running through the centre of the body, and giving off a few small branches. There are no signs of a mouth, but from the circumstances of the central bent portion of the body having a rough surface, it may be presumed that the worms are not voided entire, and indeed it is probable that nothing but the opportunity of instituting a post mortem examination of the case will serve to clear up the nature of this singular product. The notion of Rudolphi, to whom specimens were transmitted for examination, that they are simply portions of lymph cast in this peculiar form in the internal parts, is not reconcileable with the circumstance of their being very unequal in size, and not by any means uniform in shape, and having also the beautifully perfect crenate margin already described. We have been repeatedly also assured by the woman herself, that when first voided the worms may be seen to move, and that they are found to make their way to a distance in the bed. But very few specimens have been passed lately, and these only when the bladder has been previously injected, for which purpose warm water is occasionally used. The other form of worm passed will be described under the title of *Spiroptera* (p. 253.).

7. *Tænia solium.* The common tape worm of this country is generally from five to ten feet in length, and in breadth from the fourth part of a line at its anterior part to three or four lines towards the posterior part, where it again diminishes. It is composed of numerous segments, which towards the head appear to be very slightly indicated, but are more marked lower down, where they become subquadrate, and at length elongated, so that the length of each segment exceeds the breadth.

The head is small and somewhat flattened In the centre of it is a projecting papilla armed with a double circle of hooks, and around this are four apertures or suckers, placed at equal distances, which constitute the true mouths by which nourishment appears to be imbibed. Each of the joints is also furnished with a pore situated in the centre of a small prominent papilla; the pores occurring on either side alternately. These were formerly supposed to furnish each joint of the animal with a means of obtaining nutriment independently of the head, but are now generally believed to be connected solely with the generative system. From the mouth proceeds a canal or vessel on either side: these run parallel and near the margin of each segment, from one extremity of the animal to the other, being connected by numerous transverse vessels, of which there is one at the top and bottom of each segment. These canals may be easily injected by a pipe placed in one joint, the injection running readily into several contiguous joints. It is supposed that some amount of nourishment may also be effected by cutaneous absorption.

The generative apparatus in the tænia consists of a ramified canal or ovarium occupying the greater part of the centre of each joint, and containing the

ova. From this a duct is extended to each lateral pore, to allow of the escape of the ova, and these latter are supposed to be impregnated, in their passage outward, by the secretions from a small vesicle furnished with a duct, which terminates at the same point as the oviduct. These worms are very rarely passed entire: single joints often come away, especially in children; or portions of two or three feet in length are voided, but it is very rarely that the portion on which the head is situated is thus passed. There appears to be no limit to the length to which the worm may grow. If we are to credit the older writers, many hundred feet have been attained, but there appears to be no reason to doubt that worms measuring sixty feet are of occasional occurrence. As many as eighteen or twenty worms have been passed in the course of a few days, but frequently they occur singly.

The *symptoms* caused by tænia are in many instances not exhibited in a striking degree; indeed, it not unfrequently happens that the passing of a portion of tape-worm is, to the patient, the first indication of its presence. More frequently, however, the functions of the stomach and bowels are impaired. There is either a loss of appetite or a continual craving for food; pains in the stomach and bowels are often complained of, and certain uncomfortable sensations are referred to the supposed movements of the worm; but, probably with the exception of those cases when the worm accumulates in tangled masses and so causes obstruction of the bowel, their presence cannot give rise to any distinct sensations on the part of the patient. They cause, however, itching about the nose and anus; and the bowels are either relaxed, or more often in a state of constipation. The constitution is generally more or less affected. Giddiness, headach, stupor, dulness of vision, weariness and pains in the limbs, accompanied by pallor of countenance and emaciation, and indeed a general torpor of the system not unfrequently accompany the presence of this parasite; especially in the ill-fed, who appear to be more than others liable to become infested with this worm. The habit of passing portions of tape-worm will continue with some individuals for a period of several years. In others all the symptoms subside rapidly, and the body is restored to a perfect state of health shortly after the complete expulsion of the parasite. It is by no means uncommon to observe a number of separate joints expelled at a time, especially in children; a circumstance which has led to the mistake of supposing that each joint was a separate worm of some very different genus.

Treatment. The remedies which have been found most efficacious in the treatment of tape-worm, are oil of turpentine and some empyreumatic oils; the root of the pomegranate and of the male shield fern; zinc filings, and drastic purgatives. Many other anthelmintics have been proposed for the expulsion of this worm, but are either very inferior to these, or totally inefficacious. And of those just enumerated, the oil of turpentine appears to have obtained so decided a superiority in the practice of the present day, as to have almost entirely superseded the use of other remedies.

The use of the oil of turpentine appears to have been first noticed by Mr. Malden in the Memoirs of the London Medical Society for 1792; and though, since that time, it had been used by Dr. Sims, and also recommended in the work of Rudolphi, it does not appear to have been generally known to the profession until the publication of a letter to Dr. Baillie by Dr. Fenwick in the *Medico-Chirurgical Transactions*, vol. ii. in which the author speaks of oil of turpentine as a new remedy, and relates several cases in which it had been exhibited with success. The quantity given in these cases was two ounces, which, if no evacuations were procured was followed by another dose of one ounce, and this succeeded generally in bringing away the worm dead, in from half an hour to an hour afterwards. "From the general failure," he observes, "of purgative medicines in this disease, and from the worms being dead when they are passed, we may conclude that, besides its purgative quality, the oleum terebinthini is really poisonous to the tænia; but although destructive to the worms present, it does not appear to remove the tendency to generate others.

And in reference to the largeness of the dose recommended, he remarks, that "its quick action on the bowels prevents its absorption, and, accordingly, we find in these cases no complaint of those affections of the urinary passages which have arisen from much smaller doses." With regard to the mode of exhibition, he recommends "to take either no supper, or a very light one the night before; to abstain from all food or liquid till the medicine has operated twice or thrice, or a worm has passed, and then to dilute freely through the day."

The oil of turpentine is not now usually given in such large doses as here recommended. The dose for an infant, says Dr. Mason Good, is from half a drachm to a tea-spoonful given in milk; a child of ten or eleven years old may take an ounce without any evil effects in ordinary cases: but in delicate habits a full dose sits uneasy on the stomach, and disquiets the system generally, though in different ways: for it sometimes produces a general chill and paleness, sometimes a tendency to sleep, and sometimes an alarming intoxication. It is in small doses alone, as half a drachm or a drachm to an adult, that it enters into the circulation, and proves an acrid irritant to the bladder, often exciting bloody urine.

The remote effects upon the urinary organs may in most cases be avoided, by taking care to give the turpentine in sufficiently large doses to ensure its purgative action, and thus to prevent its retention in the bowels for so long a time as to favour its absorption; or, if it do not thus act, to combine it or follow it up with a dose of castor oil. The combination of half an ounce of oil of turpentine with an equal quantity of castor oil, or double the quantity of olive oil, will be generally found to accomplish the intended object with little, if any of the unpleasant effects attaching to the use of this remedy. The sense of giddiness and intoxication, however, appear in most cases to be the unavoidable accompaniments of this medicine: they are generally only of short duration but will sometimes continue for several days afterwards, accompanied by headach, and must in that case be combated by gentle purgatives as long as the unpleasant sensation continues, and any smell of turpentine remains in the urine. To avoid the occurrence of gastric or intestinal, or urinary irritation during the use of the remedy, it is desirable to take freely of broths and mucilaginous decoctions; and, to avoid sickness, the patient should remain at rest; and take the medicine two or three hours after a full meal rather than upon an empty stomach. It is frequently necessary to repeat the medicine two or three times, with intervals of a day or two, and, when half an ounce is not sufficient, to increase the quantity to an ounce or even two ounces where the constitution is strong; but this larger dose is not often required, and should not be exceeded. The turpentine, when given alone or combined with castor oil, is most conveniently exhibited in milk or in some of the aromatic waters. The various forms which have been proposed for making it into an emulsion are objectionable, both on account of their proving more offensive to the stomach than the plain oil, and, also, from the minute subdivision favouring absorption into the circulation, and diminishing the purgative power of the medicine.

Chabert's empyreumatic oil, though not much known in this country, appears to have attained a high reputation on the Continent as a vermifuge in the treatment of tænia. Rudolphi considers it as the very best of all vermifuges, and Bremser attaches a very high value to it. The observations of Chabert on its efficacy in expelling worms from oxen, sheep, and dogs, appears to have led to its exhibition in man. The oil is prepared by mixing together one part of empyreumatic oil of hartshorn with three of oil of turpentine, and, after allowing them to stand for three days, distilling off three fourths of the mixture by the aid of a sand bath. It appears to be very similar in its effects to the oil of turpentine, but is even more unpleasant to the taste, especially after being exposed to the air, when it becomes blackened, and is rendered thicker and more nauseous. According to the experience of Bremser, who has used Chabert's oil in many hundred cases, it not only has the advantage of de-

stroying the worms, but also appears to exterminate their ova, and thus effects a permanent cure; as the proportion of cases in which the parasite was found to return was not more than one per cent. of the number treated. He has given it to children of a year and a half old with impunity. He begins his plan of treatment by the exhibition of a purgative electuary, and then gives two tea-spoonsful of the oil in a little water, night and morning, and, when in the course of a few days, about three ounces have been taken, a purgative is interposed, and the oil resumed until from four to six ounces altogether have been consumed. He recommends during the time a moderate diet, and cautious use of farinaceous food and fatty substances. The worm is not generally expelled, immediately and entire, as after the use of turpentine, but appears to remain and become partially digested and disorganised, and hence the efficacy of the treatment is to be gathered, rather from the cessation of the symptoms, than from the obvious expulsion of the worm, which, in many cases, could not be detected. This remedy is liable to the same objections as the oil of turpentine, and is apt to produce the same symptoms of irritation both in the digestive and urinary organs, and also in the cerebral system. These it is recommended to obviate by the same means and precautions as are to be followed in the use of turpentine; and some authors consider it safer to begin with a smaller dose than that recommended by Chabert; as half a tea-spoonful, gradually increased. The nauseous flavour may be in some measure covered by the addition of syrup of lemon, or by forcibly rincing the mouth afterwards with water, and then chewing a clove or piece of cinnamon; or the oil may be made into small boluses, and swallowed enveloped in thin wafer paper.

Dipple's animal oil, given in doses of a few drops in water or emulsion, and repeated two or three times daily, has proved efficacious in the treatment of some obstinate cases, but appears now to have fallen into disuse.

The bark of the pomegranate root (*punica granatum*) has somewhat recently obtained reputation as a means of expelling tænia, though it is spoken of as a vermifuge by Celsus. The attention of the profession appears to have been called to it by a paper by Mr. Breton published in the *Medico-Chirurgical Transactions*, vol. xi. p. 301., and entitled, "On the efficacy of the Bark of the Pomegranate Tree in cases of Tænia." The author states that, "having observed, in Dr. Fleming's catalogue of Indian medical plants and drugs, that the decoction of the bark of the pomegranate root is ranked as an efficacious remedy for the removal of tape-worm, he had afterwards an opportunity of putting its effects to the fairest test of experiment, and relates eight cases in which the remedy had been effectual in getting rid of the worms.

The bark was used by him both in the form of decoction and powder. The decoction was, in the first instance, made by boiling two ounces of the recent bark of the root in a pint and a half of water, and reducing this to three quarters of a pint. About two ounces of the cold decoction were given, and repeated four times at intervals of half an hour. About an hour after the last dose, an entire tænia was voided alive, measuring eight feet in length. A decoction, made with a similar quantity of the dried bark, was found to be rather too strong, producing giddiness, sickness, and uneasy sensations in the bowels, but equally expelling the worms. The dried bark in the form of powder, in doses of one or two scruples, mixed with an ounce of cold water, was given in other cases with similar results, and their form of exhibition appeared preferable on account of the greater mildness of its action. With a view to ascertain the nature of the action of this substance upon the tænia, some living specimens were placed both in the decoction, and also in the water with which the powder was mixed. The instant they were plunged in these preparations, they writhed and otherwise manifested great pain, and died in the space of five minutes. In plain water these worms will live several hours after expulsion. The use of the pomegranate root, both in this country and in France, appears to have borne out the favourable character which it had previously acquired in India, and both Cloquet and Martinet speak of it as being the remedy which in France

is chiefly trusted to for the expulsion of tænia. It is recommended that the medicine should be exhibited to the patient fasting, and should be followed by a purgative, as a full dose of castor oil.

The root of the male shield fern (*aspidium filix mas*) spoken of as a vermifuge by Pliny and Galen, has acquired some notoriety in modern times. It constituted the basis of Madame Nouffer's treatment, whose secret was purchased in the last century by the French government at a large sum. In preparing the root, or underground stem, the outer part is to be removed, and also both extremities, that is, the upper greener part, and the lowest or oldest portion. The root is then to be pounded, and from two to four drachms of this taken in water. It is however a nauseous medicine, and requires to be long persevered in, and given sufficiently often to keep the bowels constantly full of it. Hence it is very apt to disorder the stomach. M. Peschier has recommended as a substitute the *oil* of fern root, prepared by treating the root with æther. Thirty drops of this oil are equal to three drachms, or a full dose of the powder, and this quantity is recommended to be given in two portions, either in pills, or in the form of an emulsion. In those cases where it succeeded, the worm was expelled lifeless. The success of this remedy appears to be chiefly exhibited against the bothriocephalus latus, but in the treatment of the tænia of this country, its efficacy appears very doubtful. The efficacy of the oil shows that the action of the fern root upon the worm, is not as has been supposed merely mechanical.

Drastic purgatives appear to be of less value in the treatment of tænia than in that of other worms. The exhibition of purgatives has been shown to be in most instances a necessary accompaniment to other remedies ; but, given alone, they will very seldom succeed in effecting the expulsion of tape-worms, and should not therefore be given until other remedies have failed.

Lastly may be mentioned zinc, either granulated or in filings. The action of this remedy appears to be purely mechanical. Hence, as might be supposed, the filings, from being sharper, have been found more efficacious in expelling the worms than the grains. Alston recommends an ounce of the filings to be taken in four ounces of treacle, a purge being first exhibited; half the quantity to be repeated on the two following days, and lastly a purge to remove all. The granulated zinc is less apt to irrritate the bowels, than the filings. Tin has been used for the same purpose as zinc.

8. *Bothriocephalus* (*βόθριον*, *scrobs*; *κεφαλή*, *caput*) *latus*. This was formerly called *tænia lata*, but is now placed in a separate genus on account of the following distinctive character. The segments of the body are broader than they are long, a circumstance which has given to the worm its trivial or specific name *latus*. The head is of a different form from that of tænia. It is small and elongated, and instead of the four round oscula characteristic of tænia, it has a longitudinal fossa or bothria on each side, which divides the head into two lobes; a minute pore, situated in the centre between these, is considered to be the mouth. In some species, however, there are certainly two pores or mouths, situated one at the extremity of each lobe of the head. The head is not armed with spines like that of tænia. The generative pores, instead of occurring alternately at the margins of the segment, are placed in a single row, one occupying the centre of each segment, a circumstance which gave rise to the two species being characterised as "tænia osculis marginalibus," and tænia osculis superficialibus." In other respects, bothriocephalus does not differ from tænia, except perhaps that the former is less opaque than the latter, and when placed in alcohol has a semi-opaline or greyish tint.

The bothriocephalus latus is peculiar to the inhabitants of Switzerland. Russia, and Poland, and of those parts of France which border on Switzerland. Hence it does not come under the notice of the British practitioners, except as it occasionally occurs in the natives of those parts visiting this country, or in the case of our own countrymen who may have resided for a time abroad. This circumstance has been already alluded to as favouring the idea of the external origin of worms; and although the truth of it has been questioned,

yet several examples might be quoted in proof of the possibility of peculiar species being thus transported from one country to another. A case of this kind lately occurred in the practice of Dr. Latham. A young lady, a native of England, had resided for some time in Switzerland, where she became subject to tape-worms, some of which were passed by stool. After her return to this country she still manifested symptoms of worms, and this circumstance, with the knowledge of her former history, led to the administration of oil of turpentine, which brought away a portion of a bothriocephalus latus several feet in length.

The *symptoms* and *treatment* of this species do not require to be noticed apart from what has been said of tænia solium.

9. *Distoma* (δὶς, *bis*; στόμα, *os*) *hepaticum*. This is commonly termed the fluke or liver fluke. Its seat is the gall-bladder and biliary duct, where it has been occasionally observed in man, and is very common in the same situation in many quadrupeds, especially in sheep, and is connected with the state called "the rot" in those animals. In form it is flattened, ovate, and elongated, somewhat pointed toward either extremity. Its under surface presents three cavities or apparent pores: the posterior one is larger than the rest, transversely oval and imperforate, being destined only for the purpose of adhesion or locomotion. The anterior pore, which is round and small, is the true mouth, and is connected to the body by a short neck. The middle pore is for the purpose of generation, and is therefore analogous to the lateral pores of tænia, and the central pore of bothriocephalus. The animal is of a yellow or light brown color. The centre of the body is mainly occupied by the digestive canals. From the anterior pore or mouth the œsophagus is continued, forming a short, wide, and somewhat funnel-shaped tube, leading to a double intestinal canal. From the outer sides of these canals short and wide cæcal processes are sent off, which ramify to the end of the body, but have no anal outlet. According to the observations of Rudolphi, when these digestive canals are successfully injected, more minute vessels may be seen to be continued from their apices, ramifying and forming a net-work over the surface of the body, and thus presenting the rudiments of a vascular system. This parasite is supposed to feed upon the bile, or perhaps upon the mucus of the gall-bladder and ducts. Besides the digestive canal, there are separate seminal and ovigerous tubes which terminate at the pore already described; and from which there may be generally seen protruding, in the full-grown specimens, a small cylindrical process or lemniscus. Reciprocal fecundation takes place in these animals, and the ova escape by an aperture situated near the base of the projecting spiculum or penis.

The flukes have been found in considerable numbers, but do not appear to give rise to any characteristic symptoms. They have been passed during life, as in the case of a girl twelve years old treated by Chabert, with his empyreumatic oil, which caused the expulsion of a great number of them.

A second species of distoma was described by Rudolphi under the term *lanceolatum*, but is no more than the young of the distoma hepaticum.

10. *Polystoma* (πολὺς, *multus*; στόμα, *os*) *pinguicola*. This has been met with but once in the human subject. It was discovered by Treutler in the cavity of an adipose tumour, connected with the left ovarium of a female aged 20, who died in childbed. The cavity was nearly filled by the worm. It is about three quarters of an inch in length, flattened, and rather convex above, and concave below: truncated toward the head, and pointed toward the opposite extremity. On the under side of the head are six pores arranged in a crescentic form. A suctorious cavity is situated on the ventral surface near the tail, at the extremity of which is also another pore. Treutler has also described another species under the name of *polystoma venarum*, which he states to have been found in the anterior tibial vein of a man which was ruptured while bathing. But this was probably a *planaria* which had been accidentally introduced there.

Class Cœlelmintha (*κοῖλος, cavus; ἕλμινς, lumbricus*).

This class comprehends the "cavitary" or hollow cylindrical worms, as distinguished from the foregoing, which are the solid worms. They constitute a more highly organised group of animals, possessing a distinct alimentary canal, having its proper parietes separate from the walls of the body, and contained in a visceral cavity which is bounded by muscular parietes. The mouth and anus are always separate, and generally at opposite extremities of the body. The organs of generation are extensively developed, and are placed on separate individuals. Most of these species have also a distinct nervous system.

11. *Trichina spiralis.* This remarkable entozoon exceeds, in minuteness of form and in numbers, every other parasite of the human body. Its seat is the muscular system. It appears to have been first publicly noticed in 1833, by Mr. John Hilton, in a subject dissected at Guy's Hospital, the muscular system of which he observed to be studded with the minute cysts of the *trichina*, which he imagined to be *cysticerci*, but in which "no organisation could be discovered with the aid of the microscope;" probably on account of the opacity of the cysts preventing a view of the contained worm. (*Lond. Med. Gaz.* vol. xi. p. 605.) The entozoon itself, therefore, remained unknown until two years afterwards, when its nature was investigated by Mr. James Paget and Mr. Owen, on the occasion of the body of an Italian, which was infested with these parasites, being brought into the dissecting room of St. Bartholomew's Hospital. The singular appearance produced in the muscular system had been previously noticed on several occasions, but no idea had been entertained of its animal nature, until the existence of the worm was satisfactorily demonstrated by the independent observations of Mr. Paget and Mr. Owen, the latter of whom published a minute description of the parasite in the *Transactions of the Zoological Society of London*, vol. i. p. 315. and named it accordingly. Our own observations on the minute structure of this entozoon will be found in the *London Medical Gazette*, vol. xvii. p. 382. Since the period of its discovery, the *trichina* has been observed in many of the subjects examined in the various dissecting rooms in London; but even still, on account of its extreme minuteness, it is probably often overlooked.

The cysts are generally so numerous as to give to the muscles in which they are found a peculiar grey speckled appearance, as if the part had been thickly sprinkled with the eggs of some small insect. They are seen to consist of minute white ovate grains, which require the aid of the microscope for their examination. If a small portion of the infected muscle be laid upon a strip of glass, or compressed between two glasses, and examined by transmitted light with a single lens of a half or quarter inch focus, or a compound power of an inch focus; the cysts are observed to be arranged with their long axes parallel to the course of the muscular fibre, and closely adherent to the interfascicular cellular tissue; this adhesion being closest at either extremity of the cyst, so that they are not easily detached. The cysts are generally about one thirtieth or one fortieth of an inch in their larger diameter, and from one third to one half of their length in their shorter diameter. They are in form elliptical, attenuated toward the extremities, which are opaque and bulging in the centre, which is usually transparent. The opacity is due to the presence of earthy matter, which is often so abundant as to produce a gritty feel in pressing the cysts under the dissecting needle. When the cysts are sufficiently transparent, the outer cyst is seen to be occupied by an inner one of a more regular elliptical form, which by practice in the manipulation can sometimes be detached from the outer one: but, without this process, the inner cyst may generally be seen to be occupied by a minute worm coiled up in its interior, and disposed in from two to three spiral turns; the two extremities of the worm pointing generally to the centre of the short diameter. The cysts present many varieties in form; sometimes they have only one opaque extremity, and sometimes

both are absent. In general, each cyst contains only a single worm; but in one subject which we have dissected most of the cysts contained two worms; and one contained three. The cysts are often so opaque as to prevent the worm from being seen through its walls, and sometimes the cysts are found when cut open to contain only a granular fluid. The worm itself when extracted from the cyst, which it occupies in common with some granular fluid, and extended on a piece of glass, is found to measure generally one thirtieth of an inch in length, and about one seven hundredth of an inch in diameter. It is cylindrical and filiform, terminating obtusely at one extremity, but tapering toward the opposite end for about one third of its length, and ending in a point. According to our own observations, the worm possesses a distinct alimentary canal. Commencing from the large end of the worm, the canal is seen bounded by two slightly irregular lines, running parallel to each other for a distance of about one third or one fourth of the length of the body, where they terminate in a transverse line presenting a slight concavity toward the larger end, and indicating the termination of the first portion of the canal. From this point the canal assumes a sacculated form, and these sacculi appear as if bound down by a line extending along the surface of the canal in the direction of its axis. This line is not dissimilar to the longitudinal bands of the human colon, but may possibly be a nervous filament. The sacculated character of the intestine becomes gradually lost towards the smaller end, where the part assumes a zig-zag or spiral course, and at length terminates in the smaller end.

In some instances where the worms were alive when examined, the intestine was seen to be drawn backwards and forwards several times within the body of the worm; and if the worm be cut across, this part may be observed to protrude to a considerable extent from the divided extremity. An aperture was repeatedly observed at the larger extremity, which, when viewed laterally, had a notched appearance; and, occasionally, appearances were observed indicating a smaller aperture at the opposite end of the worm. At about one fifth of the entire length from the blunt end, a small group of granules was, in most instances, observed occupying about half the diameter of the worm, and probably constituting an ovarium. The worms, if examined recently, are generally found to be alive, and will continue to live, sometimes for several days after the death of the individual in whom they are found; and, in one instance, they were observed to move after the portion of muscle from which they were extracted had been immersed for a day in spirit.

The singular locality of this entozoon, and the immense numbers in which it is found thus occupying the muscular system, suggests, more directly perhaps than any other species, the question as to its origin; but, unless we admit its spontaneous production, there is no other way of accounting for its presence than by supposing that its ova or germs must have circulated with the blood, and have been thus distributed through the muscles; and if we admit the little granular bodies already described to constitute the germs, then there is nothing unreasonable in such a supposition, since the size of these bodies is such as to allow of their readily passing along the minute bloodvessels. It is considered by Mr. Owen that the *trichina* is not a distinct and perfectly grown species, but is probably the young of some other genus, perhaps a *strongylus.*

All parts of the muscular system do not appear to afford an equally favourable nidus for the development of this parasite. The superficial muscles are found to contain them in far greater numbers than the deep-seated ones, and especially the broad flat muscles, as the pectoralis major and latissimus dorsi. They are generally present, however, in a greater or less degree, in all the muscles of the trunk and extremities, and have been found in those of the eye, and external and internal ear, in the tongue and soft palati, the constrictions of the pharynx and the œsophagus, the crura and the radiated portion of the diaphragm, in the levator and external sphincter ani, and the muscles of the urethra. Indeed, the only muscular structures that seemed free from them

were the heart and muscular envelope of the stomach, intestines, and urinary bladder, together with one or two other exceptions. The outer cyst, in all probability, does not properly belong to the worm, but may be supposed to be formed around it by the adjacent parts after the usual manner of entozootic cysts; but it may be questioned how far the inner cyst is formed in the same way, or whether it may not rather be looked upon as constituting a proper envelope to the embryotic worm.

The history of the cases in which the *trichina* has been found, does not afford any clue which might serve to explain the cause of their presence. They have been found equally in the diseased and in the healthy; in those who have died from chronic disease attended by atrophy, and in those who have been cut off in robust health by some violent accident, as fracture of the skull. They have been also equally observed in the dead-house of the hospital when the examination has been made a few hours after death, and in the dissecting room where it has been delayed for some days. No symptoms have been in any case manifested during life which could lead to the supposition of their existence, and in all cases the individuals themselves appear to have been unaware of their presence.

To those who may have the opportunity of examining this remarkable entozoon, which appears to have been so long overlooked, probably on account of its minute size, the following observations, as to the best method of pursuing the investigation, may not be without use. To examine the worm, a very thin slice of the muscle, containing about half a dozen cysts, should be placed upon a slip of glass, with a drop of water. This being placed on the stage of the microscope, under a lens of half or a quarter of an inch focus, one of the cysts is to be separated from its attachment to the surrounding cellular tissue, by means of a couple of needles fixed in handles, leaving it however adherent at one extremity, which serves to fix it, while the other is cut off by a cataract needle, or other fine and sharp instrument, so as to open the inner cyst, but without injuring the worm. This is the most delicate part of the operation, and requires some practice to effect it dexterously. As soon as the cyst is opened, the worm, which is free within it, generally starts out, from the pressure used during the operation; or its expulsion may be effected by a very gentle pressure upon the opposite extremity of the cyst. Every thing being then removed from the glass except the worm, this is to be covered by a very thin piece of talc, taking care that there is sufficient water between the talc and glass to prevent the worm being injured by pressure. The object may then be examined by a power ranging from 200 to 500 linear measurement, always using daylight in preference to any other. These examinations should be made, if possible, upon the living worms, at least as far as the internal parts are concerned, since the natural appearances are often entirely lost when the worms are dead, or they are replaced by others, which are likely to convey erroneous impressions. The living worms, moreover, will sometimes uncoil themselves, so as to admit of their structure being more clearly seen than when two or three coils are lying over one another, as in the usual position of the animal. The uncoiling, however, may generally be effected by means of a couple of hooked needles.

The cysts are best examined by placing the thinnest possible slice of muscle between two slips of glass, or one of talc and one of glass, and slightly pressing them, so as to distribute the muscle in a thin layer. If the edges of these are surrounded by white paint, so as to prevent evaporation, the specimens may be preserved for several months, but become at length decomposed. This method is far preferable to that of drying and placing them in Canada balsam, which renders the cysts too transparent.

12. *Filaria medinensis.* The Guinea, or hair-worm. This worm is developed in the sub-cutaneous cellular texture, chiefly of the lower extremities, especially the feet, and in the scrotum, but has also been occasionally found in the abdominal and thoracic parietes, about the head, neck, arms and hands, and

even beneath the conjunctiva of the eye. In length the worm varies from about six inches to twelve feet: its diameter, which is nearly equal throughout, is half a line or rather more, being a little attenuated towards the anterior extremity, where the mouth is situated, surrounded by a slightly raised lip. The opposite extremity is obtuse in the male, and furnished with a spiculum; but in the female it is acute, and more suddenly inflected. The body is round, sometimes of a whitish colour, but more often dark brown. The external tunic is of a fine elastic texture, and marked by minute circular striæ, which are probably muscular fibres. Within this are readily seen the longitudinal muscular fibres arranged in two bands, and separated from each other by two longitudinal depressions, one on each side of the body, which are conspicuous externally. Dissection has, in many instances, failed in detecting either digestive or generative tubes in the interior of this species, though they have been frequently found completely filled with young, their generation being viviparous. These young *filariæ* appear to be contained in the free cavity, or muscular envelope of the body, along with some granular matter, but without any specific covering, or enveloping tube; and Rudolphi states, that he has met with *filariæ* thus stuffed with countless thousands of young progeny.

The worm appears to be capable of slowly changing the positions which it occupies in the cellular tissue, and probably its extrusion is effected by a process of inflammation and suppuration, as in the case of other foreign bodies. It usually occurs singly, or in small numbers. From ten to twelve, however, is in some localities not an uncommon number; and even as many as fifty have been met with in a single individual. It appears to be a parasite peculiar to warm climates, and is most abundant in Arabia, Upper Egypt, Abyssinia, and Guinea. It usually attacks the natives, but Europeans and others visiting these parts have occasionally become infected with it; and in some districts it has prevailed to such an extent as to affect one fourth part of the population. The idea that it is capable of being communicated by contagion has been entertained by many who have had competent opportunities of making observations on that point; but as to the source from which it is derived, but little satisfactory knowledge has been obtained. It has been supposed by some to be introduced in the form of ova in the drinking of stagnant water; and many writers have thus attributed its presence to the use of water of bad quality; and it appears pretty certain that dogs kept in the hospitals, and fed on the poultices with which the sores produced by filariæ have been dressed, have became affected with this species. On the other hand, the native inhabitants, still attributing it to the water, and noticing its abundance in the rainy season, have generally supposed that it is introduced through the skin, especially while bathing; and it has also been observed that the water-carriers in India frequently suffer from this parasite, which more particularly infests the skin of the back at the part which is kept continually wetted by the leathern water-bottle being frequently in contact with it.

The Guinea-worm does not appear generally to excite any very prominent disorder of the part immediately on its introduction, but may lie dormant, or perhaps undeveloped, at least without manifesting any signs of its presence, for a period of several weeks or months. The first symptoms are generally those of uneasiness, or itching in the part occupied by the worm; which is sometimes attended by a slight cord-like elevation indicating its seat: to this succeeds the formation of a vesicle or pustule, which breaking and discharging more or less fluid, at length gives exit to the head of the worm, at the same time that a certain amount of constitutional disturbance is often experienced by the patient. The suppurative process is often attended by considerable swelling of adjacent parts, and the pain experienced is at times very severe.

The treatment consists in aiding the expulsion of the worm by careful manipulation. If the worm is short, and the texture of the part which it occupies loose, as the scrotum, it may sometimes be extracted at the first attempt; but

more often its removal is a tedious process, extending over a period of many weeks. It has been usually recommended to allow the worm to make its way spontaneously to the surface, and then, as soon as any hold can be obtained upon it, to gently draw it forwards until some resistance is felt, and then to prevent its retraction by winding the protruded portion round a piece of adhesive plaster on a bit of stick or bougie, which is to be kept in contact with the aperture and covered by some light dressing, the attempts being renewed once or twice daily until the whole has been extracted. When the worm is seated near the surface, the process of extraction may be much accelerated by cutting down, as nearly as can be guessed, upon the middle of the worm, and so commencing the traction from its centre.

The object of this caution in extracting the worm is to prevent its being broken; an accident which appears to be generally followed by violent inflammation and the formation of abscesses and sinuses in its course, accompanied by much constitutional disturbance. These serious consequences were supposed by Hunter to be caused by the contact of the dead animal with a considerable extent of living surface: but from what has been said of the structure of the worm, it will be readily seen that its rupture, or breaking across, must be followed in many cases by the escape of thousands of young *filariæ* into the wound; a circumstance quite sufficient to account for the degree of mischief thus produced. The fistulous ulcer generally heals rapidly after the extraction of the worm.

13. *Filaria oculi.* This species was observed by Nordman in the human subject. A patient of Baron von Gräafe had undergone the operation of extraction, and the crystalline lens had been brought away with its capsule entire. On opening this half an hour afterwards, there were found in the liquor Morgagni two minute and delicate *filariæ* coiled up in the form of rings. The more perfect one of these measured only three fourths of a line in length, having a simple mouth, without projecting papilla, and the body so transparent as to allow of the straight alimentary canal being seen through the parietes, surrounded by the tortuous ovigerous tubes, and terminating in a curved anal extremity. A larger species of filaria is not unfrequently met with in the eye of the horse.

14. *Filaria bronchialis.* This, like the former species, has been met with only once in man, when it was observed by Treutler in an enlarged bronchial gland of a phthisical patient. The worm was about an inch in length, and curved somewhat in the form of the letter S; its colour dark brown with white spots. The body was somewhat flattened, attenuated towards the head, but obtuse at the anal extremity, which emitted a male spiculum. It is described by Treutler under the name of *Hamularia lymphatica.* (*Opusc. Pathol. Anat.* p. 10. tab. 2, f. 3—7.)

15. *Tricocephalus* (*ϑρὶξ, capillus*; *κεφαλὴ, caput*) *dispar.* This worm is commonly found in the cæcum and large intestine, but has been detected in every part of the alimentary canal as high as the pylorus. It is sometimes called the long thread-worm. The body of the male, which is smaller than the female, is generally found spirally convoluted in the same plane. It measures, when uncoiled, from one to two inches in length. The anterior capillary portion of the body is exceedingly slender, and forms about two thirds of the length of the worm: it is occupied along the centre by the simple straight alimentary canal, terminating in a small orbicular mouth. The capillary portion bulges somewhat suddenly into the main part of the body, which contains a sacculated or moniliform intestine. The body terminates in an obtuse anal extremity, which in the male bears a projecting intromittent spiculum, furnished with a sheath; but in the female exhibits only a simple foramen, serving for both anus and vulva. In the former, the tortuous spermatic vessels, and in the latter, the oviducts containing eliptical ova, are seen terminating at these points.

Dr. Baillie speaks of this worm as of rare occurrence, not only in this but

in every other country; and previously to the year 1760, when it was discovered in Germany, it appears to have been totally unknown. Yet there is probably no other human entozoon of so frequent occurrence as this; and we must therefore suppose, that on account of its comparatively delicate form it has been generally overlooked. Of twenty-nine bodies examined by Dr. Bellingham of Dublin, at St. Vincent's Hospital, the worms were found in greater or less number in twenty-six. During the mortality of the cholera at Naples, M. Thibault took the opportunity of examining them, and in eighty cases examined, many of the individuals having died of other affections than the cholera, the worms were found in the alimentary canal in all without exception. And, according to Mr. Curling, during the winter before last, they were detected at the London Hospital "in nearly all the cases in which much pains were taken in looking for them, in the intestinal canal of healthy persons destroyed by severe injuries, as well as those cut off by acute and chronic diseases." (*Med. Chir. Trans.* vol. xxii. p. 285.) They are often found in considerable numbers, and either loose, or having the long filiform anterior extremity of the body imbedded in the substance of the mucous membrane, while the posterior portion floats freely in the cavity of the intestine. It is remarkable that they do not appear, in most cases at least, to give rise to any symptoms indicative of their presence; and that they are found as well in those who have died from violence or acute disease, as of more lingering affections.

16. *Spiroptera hominis.* This worm has been already alluded to as having been expelled from the urinary bladder of the woman whose case is mentioned under the head of *Diplosoma crenata* (p. 241.) The *spiroptera* was met with only during the earlier progress of the case, and has long ceased to be passed, though the other form of worms by which it was accompanied is still occasionally evacuated. This worm is known chiefly by the description given of it by Rudolphi, to whom some specimens were transmitted in a phial for the purpose of examination. They were found to be of different sexes; the males eight and the females ten lines in length, of a white colour, slender, and very elastic. The head, rather truncated, is furnished with an orbicular mouth, and one or two papillæ. The body is attenuated towards each extremity, but especially towards the head. In the female, the posterior extremity has a short obtuse apex, and is thicker than that of the male: in the latter, there is at this point a short tubulus, which is probably the sheath of the penis. Near the tail there is the dermal aliform structure characteristic of this genus.

From the same patient from time to time have been expelled with the urine a number of granular bodies of tolerably uniform size, which are considered by Rudolphi to be merely "lymphatic concretions." From our own observations however of these substances we have no doubt that they are distinct ova, but whether belonging to either of the worms voided from the bladder, the circumstances of the case do not warrant us in determining. They appear far too large to have belonged to the *spiroptera*, while with regard to *diplosoma*, no trace of ovarium, or indeed of any cavity or tube for the purpose of containing ova, could be discovered in this remarkable entozoon. The ova continued to be passed long after the *spiroptera* ceased to appear, and have now in their turn also ceased to be produced.

The ova are about one third or one half of a line in diameter. Those which have been long in spirit are of a brown colour, and have many flattened sides; but the more recent ones are white, and perfectly spherical. They consist of an external smooth covering of firm texture, enclosing a mass of granular matter. This investing tunic is found, upon examination with the microscope, to consist of an arrangement of cells of a most beautifully regular hexagonal form, which are more readily seen upon the inner surface, and in those parts which are the thinnest and most transparent; and as this structure may be observed in almost all the more recent specimens which possess moreover the usual characters and form of ova, we cannot with Rudolphi regard them as accidental formations.

17. *Dactylius* (δακτύλιος, *annulus*) *aculeatus*. This parasite was first described during the past year, by Mr. Curling, who received specimens of the worm from Mr. Drake, surgeon, of the Commercial Road. The worms, of which a minute description will be found in the *Med. Chir. Trans.* vol. xxii. p. 275., began to be passed by the patient, a little girl five years of age, during convalescence from a slight attack of fever.

The worms were found in the urine, which was high-coloured and slightly acid. There was no corresponding derangement of the urinary or any other organs, and the discovery of the worms was quite accidental. When first passed they floated separately in the urine, but in a short time they coalesced, and coiled themselves up together in the form of a ball, at the bottom of the vessel, and it was with difficulty that they could be separated. When disturbed, their motions were often lively, and if allowed to remain in the urine they lived for two or three days. They were very transparent, and of two sizes, the larger worms being more numerous than the smaller.

The worm is of a light colour, annulated, cylindrical, but tapering slightly towards both extremities, chiefly towards the anterior, which is the smaller. The female measures about four fifths of an inch in length; the male, as is the case with most of the nematoid worms, is smaller, being about two fifths of an inch long. They varied, however, a good deal in size. The head of the worm is obtuse and truncated, and has an orbicular mouth; the neck is distinctly annulated; the tail is obtuse, and also annulated, but not so much so as the neck. The tegument is a delicate transparent structure, containing two layers of fibres, one circular, and the other longitudinal. It is armed with a number of sharp-pointed spines, arranged in clusters of three, four, and sometimes five, in longitudinal equi-distant rows. The worm appears to have the power of protruding and retracting these spines at will; the motions being effected apparently by a number of fibres radiating outwards in the substance of the tegument. The alimentary canal, which was of a yellow or brown colour, appeared to commence at the mouth by three small convoluted tubes, which were shortly afterwards united into a single one. This tube, after proceeding some distance in a tortuous course, became sacculated, enlarging in its descent, and terminating at the extremity of the tail in a trilobular anus. A very free movement of the alimentary canal was observed, and the sacculi were seen to close and dilate by a sort of peristaltic action. By the side of the alimentary canal was observed a pulsating tube, probably analogous to the dorsal vessel of the annelida; and currents of minute globules were seen passing in various directions between the intestinal canal and the external tegument.

The structure of the female worm is much more complicated than that of the male. The vulva is situated near the anterior extremity, about one fifth of an inch from the head, where it forms a mamillated process, and the body swells out at this part. The oviducts consist of two small tubes, commencing at the vulva, and pursuing a tortuous course round the alimentary canal as far as midway between the anus and vulva.

18. *Strongylus gigas*. This is by far the largest of all the entozoa belonging to the class *Cœlelmintha*. It has been known to measure a yard in length, with a diameter of half an inch. More frequently however, it is found from twelve to fifteen inches long, and about two or three lines in diameter. Its seat is the kidney, the parenchymatous structure of which is generally found to be more or less destroyed; and in one specimen preserved in the museum of the Royal College of Surgeons, nothing but the proper capsule of the kidney remains, forming a cyst around the worm, which in this instance is remarkably large.

The male strongylus is smaller than the female. The body is attenuated at each extremity; it is marked by circular striæ, and has two longitudinal depressions, marking the arrangement of the tegumentary muscular fibres. The head is obtuse; the mouth orbicular, and surrounded by six hemispherical

papillæ. The tail is strongly incurved in the male strongyle, and terminates in a dilated pouch or bursa, from which projects the intromittent spiculum or penis. In the female, the tail is less curved and less attenuated; the anus is placed a little below the extreme point, but the vulva is situated about two inches from the anterior extremity of the body. These characters will serve to distinguish this worm from the *ascaris lumbricoides*, with which it has been sometimes confounded.

From the mouth, situated between the six papillæ, begins the œsophagus, round, and slightly tortuous, which, after proceeding about two inches backwards, suddenly dilates into the intestinal canal, apart from which there is no distinct gastric cavity. The intestine is not cylindrical but quadriform, and from its four angles pass off an equal number of longitudinal mesenteric processes, which are attached to the abdominal parietes. The inner surface of the abdominal parietes is covered by minute papillæ, which are supposed to imbibe the nourishment that may exude from the alimentary canal, and carry it to four longitudinal vessels, which occupy at equal distances the muscular integument. The alimentary canal is nearly of equal diameter, from the termination of the œsophagus to the anus. The female possesses a single tortuous ovary. It commences near the anus in a blind pouch, and, after forming two long loops about the middle of the body, proceeds forwards, and suddenly dilates into a receptacle or uterus of three inches in length, which again contracts for an inch, to form a slender cylindrical vagina terminating at the vulva near the head, as already described. In other species the oviducts are double. The nervous system consists of a slender collar or ring surrounding each extremity of the alimentary canal, and having a single connecting cord running along the ventral aspect of the body. A great variety of strongyles are met with in different parts of animals.

The worm appears in some instances to cause great suffering, and its presence has been generally attended by bloody urine, which symptoms have ceased on the passing of a worm by the urethra. Bremser has mentioned several cases of this kind. The worm has also occasionally caused retention of urine, probably from becoming engaged in the urethra. In one case related by Roux, the worms were discharged from the kidney, by the formation of a fistulous opening outwardly.

19. *Ascaris lumbricoides.* The round worm. This worm was described by Hippocrates under the name of ἕλμινς στρογγύλος. It is commonly spoken of as the *lumbricus*, but differs from that genus in many important particulars. It is often met with in children, especially those who are ill-fed, in whom it is more common than in adults; but in the aged it is comparatively rare. The seat of this worm is properly the small intestines, but it sometimes makes its way into the stomach or œsophagus, and even into the posterior nares, trachea, and bronchi, and has been found in the biliary and pancreatic ducts, and gall-bladder.

The worm varies generally from six to nine inches in length. The body is round and smooth, of a white or yellow colour, and attenuated towards either extremity, but more particularly at the anterior one. The head is furnished with three tubercles which surround the mouth, and which will at once serve to distinguish this entozoon from the *lumbricus* or common earth worm. The anus is situated close to the extremity of the tail, which terminates more obtusely than the head. The female is distinguished from the male by having the posterior extremity straighter and thicker, and not abruptly curved inwardly as in the male; and by having a constriction at about one third of the entire length from the head, at which point the vulva is situated. The male is also smaller, and much more rare than the female.

The worms, when recently voided, are more transparent than when preserved in spirit, so that the viscera may often be seen through the parietes. The integument is marked by numerous circular fibres, indicating the course of the muscles, and also by four longitudinal lines, which extend at equal

distances from the head to the tail, and indicate the course of the nerves and vessels. The dorsal and abdominal lines correspond to the nervous cords, which commence at a circle of nervous matter surrounding the œsophagus, and pass downwards, to be distributed along the whole course of the body. The lateral lines commence on each side of the mouth, enlarging in their course, about the centre of the body, and denote the situation of the main branches of the vascular system.

The œsophagus is muscular, narrow, and about four or five lines in length, and separated by a constriction from the rest of the alimentary canal. The intestine becomes narrower about the middle of the body, where it is surrounded and pressed upon by the tortuous generative tubes, but again gradually enlarges to within a short distance of its termination. The intestine is thin and easily lacerable, and is connected chiefly at its upper part by slender radiated filaments to the muscular parietes; similar papilliform processes to those described in the strongylus are here met with, but larger and more numerous. They are found chiefly in the dorsal and ventral regions, and are continued from numerous transverse bands which pass across the body from one side to the other.

The generative organs in the female are very extensively developed: they consist of vulva, vagina, uterus, and tortuous tubular ovaries. The vagina commencing at the vulva, is a narrow slightly wavy canal, about half an inch long, and leading to a very short uterus: this soon branches into two ovarian tubes which, somewhat tortuous, proceed backwards to near the tail, where they gradually diminish, and then becoming again inflected forwards, form a tangled coil of exceedingly minute vessels, each of which, when unravelled, measures as much as four feet in length. In these tubes are contained the ova. A somewhat similar structure is found in the male, constituting the testes or seminal tubes; it is convoluted, like the ovarian tubes of the female, and measures from two to three feet in length; the tube, however, is single. At its base is a seminal reservoir about an inch in length, communicating with the penis, which projects from the anterior part of the anus, in the form of a slender, conical, slightly curved process, furnished at its extremity with a minute pore.

These worms are considered to feed upon the mucus of the intestines, the quantity of which is probably much increased by their presence. They often occur alone, but have been sometimes met with in great numbers. Frank mentions a case where eighty of them were voided in a mass by an individual suffering from fever; and Dr. Hooper has known more than two hundred of this species to be passed in the course of a single week.

The symptoms caused by the *ascaris lumbricoides* are principally those which have been already enumerated under the head of general symptoms. Dr. Heberden has given the following enumeration of them: — Pains in the head, vertigo, torpor, disturbed dreams, sudden waking from sleep with fright; convulsions, fever, thirst, pallid countenance, unpleasant taste in the mouth, fetid breath, difficult breathing, itching of the nose, pains in the stomach, nausea, deranged appetites or great craving for food, emaciation, tenesmus, itching at the anus towards evening, followed by discharge of mucous dejections mixed with pellicles. Dr. Baillie considers the most characteristic symptoms to be the swelled belly, emaciated extremities, depraved appetite, slimy stools, frequent picking of the nose, and grinding of the teeth during sleep.

The treatment of this species consists chiefly in the employment of active purgatives and bitter tonics. The purgatives most in use are calomel, jalap, scammony, aloes and rhubarb, variously combined. For general use the conjunction of calomel with jalap is preferred, from two to four grains of the former being combined with from four to fifteen of the latter, according to the age and constitution of the patient. Rhubarb may be often substituted with advantage for jalap, or added to the purgative if the quantity of jalap be diminished; and where it is necessary to repeat the purgative powder often, rhubarb is in most cases a preferable medicine. Scammony, aloes, and rhubarb,

form also a combination in very common use as a vermifuge. The action of these powders may be aided by castor oil, or the infusion of senna with some of the purgative tinctures added to quicken its effects. Care should be taken in the exhibition of purgatives not to exhaust the tone of the mucous membrane, which is already often enfeebled, and, to support this, it is often necessary to combine bitter tonics and light purgatives. The tonics best adapted to these cases have been already mentioned under the head of general treatment. The addition of an alkali will often aid in correcting a feeble or depraved condition of the stomach and bowels. These combinations may be given in the form of an electuary containing rhubarb with carbonate of iron and some of the bitter extracts, or in a draught composed of infusion of rhubarb in conjunction with soda and some bitter tonic.

Each writer on verminology appears to have his favourite remedy, but they are almost all of them combinations of the medicines already enumerated, which also form the principal ingredients of the most approved empirical remedies. Hoffman generally employed a combination of assafœtida, extract of rhubarb, tansy, aloes, myrrh, and calomel. A drachm of each of these, with four grains of extract of saffron and the same of castor, was to be mixed together, and each scruple of this divided into fifteen pills, of which from five to eight were the dose. Bremser speaks very highly of the following formula, which he says he has rarely occasion to repeat: ℞ Semin. Santonici et Sem. Tanaceti rude Contus. āā ℥ss; Pulv. Valerian. ʒ ij; Jalapæ ʒ iss — ij; Potass. Sulph. ʒ is — ij; Oxymel Scil. q. s. ut fiat electuarium. A teaspoonful of the electuary is given night and morning for three or four days, or until an ample purgative effect is produced. The disagreeable taste of the electuary may be avoided by forming the mass into pills. He occasionally substitutes a more active purgative; and when there is much debility, follows up the treatment of the case by a ferreous tincture.

The mechanical anthelmintics, cowhage and powdered tin, have been recommended chiefly against the species. This mode of exhibiting the former has been already mentioned. The filings or grains of tin, recommended chiefly by Dr. Alston, are exhibited in scruple or drachm doses mixed with treacle, three or four times a day, for four or five days, and followed by a brisk purge. Neither of these remedies are now much used.

Oil of turpentine, which is so valuable a remedy against tape-worm, will also sometimes succeed in the removal of the round worm. It is mentioned by Mr. Rumsey in the paper already quoted, as successful in bringing away a hundred and twenty worms from a child. He gave it in small doses in the form of emulsion.

The use of common salt as an anthelmintic is of ancient date; and its virtue, in preventing the occurrence of worms in low and damp countries, is supported by good authority. It is considered to constitute the main virtue of the various sea weeds that have been recommended as vermifuges. Nash states, that he has given it with great success; he exhibited it in half drachm doses upon an empty stomach, until many pounds were consumed.

The bark of the *Geoffroya inermis* or bastard cabbage tree of Jamaica, and the powdered root of *Spigelia Marylandica* or Indian pink, have been recommended as efficient vermifuges, but as these are seldom or never employed in England, and are inferior to the remedies already named, it does not appear necessary to give any specific rules for their exhibition.

Enemas are seldom used in the treatment of this species.

20. *Ascaris vermicularis.* The thread-worm or maw-worm. This entozoon is mentioned by Hippocrates under the name which it still bears. It is the smallest of the worms inhabiting the human intestine. The males do not exceed two lines in length; the females are larger, measuring about five lines: they are very slender and elastic, and of a white colour. Rudolphi has repeatedly observed the head of this worm to be furnished with the three valvular papillæ characteristic of the genus *ascaris;* but Lamark and Bremser not ob-

serving this have referred it to the genus *Oxyuris*. The head is also furnished on each side with a semi-ovate membrane. It is narrower in the male than in the female. The body diminishes gradually towards the tail, which is slender and pointed in the female, but in the male obtuse, thicker and spirally inflected. The integument is often sufficiently transparent to allow of the internal organisation being seen through it; which does not differ in any material respect from that of the species last described.

The rectum appears to be the peculiar seat of this parasite, though it is often found also in other parts of the large intestine, and sometimes it creeps into the vagina or urethra. It is found in individuals of all ages, but young children are more especially liable to it. It occurs generally in large numbers, and masses of them are often expelled enveloped in mucus, or rolled into a ball.

The distinguishing symptoms of the presence of these worms, is the intolerable itching of the anus, coming on chiefly in the evening, recurring often with singular precision, and increased by warmth or exercise. Accompanying this, there is sometimes a dull or lancinating pain in the part, which is frequently rubbed to relieve the itching, and hence arise small tumours about the anus, resembling piles, but of a solid texture. The irritation about the anus is productive of frequent calls to stool, and slimy mucous evacuations are passed, sometimes mixed with blood. These are often the only symptoms caused by ascarides; but sometimes the appetite is depraved, digestion weak, pains in the head and stomach are felt, with giddiness, faintings, sickness, gripings, itching of the nose, cough, offensive breath, and disturbed sleep. More rarely the symptoms have been of an alarming nature, and the nervous system has been extensively deranged, the symptoms subsiding on the evacuation of the worms. The more severe irritation caused by this worm as compared with others, is probably to be accounted for by the circumstance of the worm being apparently in perpetual motion, and, on account of this restlessness and activity, it has acquired its generic name, from ἀσκαρίζειν (σκαίρω), to leap.

The treatment of *ascarides* will be found in most cases to be attended by less satisfactory results than that of any other species of intestinal worm. On account of their minute size, it is extremely difficult to dislodge them from their positions; and even when we may have effected the removal of the greater part of them, and so have afforded a temporary relief, yet those that remain behind will multiply so fast, that, in a short time the symptoms will return with their former severity, and thus individuals will continue, even for a long life, to be troubled with these annoying parasites. It is fortunate, therefore, that their presence is not usually followed by any very considerable disturbance of the vital functions, though in most cases, and especially in persons of irritable temperament, they cause a considerable amount of discomfort, and often embitter the patient's life. To remove these parasites purgatives, given by the mouth, will frequently be found to be insufficient, when trusted to alone. The seat of these worms is especially local, and they require local treatment. Hence glysters of various kinds constitute the most striking feature in the treatment of ascarides. These are given either with a view of removing the parasites by their purgative action, or of destroying them in situ. Hamilton recommends enemata consisting of aloes suspended in milk, or of decoction of chamomile flowers, with salt and castor oil. The enemata used by Macbride were composed of decoctions of wormwood and rue, or aloes and oil. Injections of turpentine, camphor, and essential oils, mixed with yelk of egg, and suspended in water or plain lime water, have been preferred by others. Chabert's oil, administered in the same form, in the quantity of two teaspoonsful in a mucilaginous decoction, has been recommended, while benefit has been in some instances derived from the natural sulphurated waters, as those of Harrowgate, both in the form of enemata, and given by the mouth; or injections of sulphuretted alkali have been used. Dr. Darwall speaks in high terms of chalybeate enemata, and recommends, for this purpose, a solution of the tinctura ferri sesquichloridi in the proportion of an ounce to a pint of water.

These and similar enemata will be found applicable to a variety of cases;

and in the selection of them, the practitioner must be guided by considerations, as to the age and constitution of the individual, the period of the disorder, and the precise effect which it is intended should be produced. Thus Martinet recommends, that we should employ them in the following series: — 1st. An ordinary aperient glyster, with a view of clearing the intestines of fæces. When this has acted, an enema of vinegar and water, or of chloruret of soda, or of common salt, for the purpose of destroying and bringing away the worms; and this, to ensure its full action, should be retained as long as possible; and lastly, an emollient injection is to be given, consisting of olive oil or some mucilaginous decoction, to remove any irritation that may remain.

But enemata of whatever kind will often fail in affording any thing more than temporary relief, unless at the same time we conjoin them with other modes of treatment. It is generally necessary to keep the upper as well as the lower portion of the alimentary canal clear by the administration of a free purgative, as of calomel and jalap, repeated according to circumstances. "Those purgatives," says Heberden, "are best, which act briskly, and of which a frequent repetition can be most easily borne; purging waters are of this kind, and jalap, especially for children, two or more grains of which, mixed with sugar, are easily taken, and may be repeated daily." Purgatives, which act more particularly on the rectum, as aloes, are often extremely serviceable, and those which bring away the greatest quantity of mucus, and thus deprive the worms of their pabulum, afford the greatest amount of relief. For children, the combination of calomel and scammony, in the proportion of one part of the former to three or four of the latter, will be found extremely useful in dislodging the worms; and the exhibition of such a powder, twice or thrice a week, will be generally followed by a copious discharge of ascarides, if any are present. Cowhage has been found useful in dislodging this species.

Various mechanical means have been devised, for bringing away the worms from the rectum. As for instance, the plan recommended by Brera, of introducing a piece of lard or a candle into the bowel, which, on being withdrawn, will be found to have a number of the worms adhering to it. Andry and Rosenstein recommended a similar plan, that of tying a piece of lard or fat of pork to a string, and after allowing it to remain in the rectum for a time, withdrawing it full of worms; or the same object may be often gained by greasing the finger, and then introducing it into the rectum, and bringing away all the worms within reach.

The inordinate itchings which constitute the most unmanageable part of the treatment, may be often considerably diminished by strict attention to cleanliness and frequent washings with cold water, by keeping the bowels always gently open; by avoiding all heating articles of food; and by the application of soothing or oily substances to the rectum, as olive-oil, which may be also injected, or when used externally having a few drops of creasote superadded — an addition which will sometimes afford instantaneous relief when other applications have failed. Rubbing the part, to relieve the itching, almost always aggravates the suffering which it is intended to allay.

Lastly, it must not be forgotten in the treatment of ascarides, that in many cases, these remedies will necessarily afford only partial and temporary relief, unless, at the same time, we pay attention to the restoration of the general health, and the establishment of the proper degree of tone of the digestive organs; and even with every well directed effort to these points, we may not unfrequently meet with cases in which the tendency to the formation of these parasites will not be checked by artificial aids, but will only cease in consequence of the gradual change in the system, attendant on the progressive development of the body in its passage from childhood to puberty or adult age.

Besides the parasitic worms which have now been described, the human body occasionally becomes the habitation of a variety of other temporary inmates, belonging chiefly to the class of insects. These being deposited in the

form of ova upon or within the external outlets of the body, as the ears, nose, mouth, or anus, and there undergoing development, or creeping in in their larva state, cause more or less irritation, and sometimes produce serious symptoms, especially when lodged in the head, where they occasionally occupy the frontal sinuses and posterior nares. The larvæ of insects lodged in this position, have sometimes caused intense headachs and even convulsions, accompanied by more or less disturbance of the cerebral functions — symptoms which have in some cases endured for years, and have only subsided on the expulsion of the offending body, generally during a violent fit of sneezing. Larvæ occupying the rectum or urinary bladder, cause symptoms of a much lighter character, not differing indeed from those caused by the entozooa in general, and often not sufficient to attract attention, until the true cause is accidentally discovered.

It would be useless to attempt a classification or even an enumeration of these various fortuitous inmates of the human body, of which numberless examples are recorded in the various medical journals and periodicals. They belong, as has been said, chiefly to the class of insects, and are introduced from without either in the state of ova or of larvæ, — the former generally in the way which we have mentioned; the latter being imbibed with various articles of food especially fruits and vegetables, or impure water, or inhaled into the nostrils in the act of smelling flowers. They may also possibly creep into the various passages during sleep.

As these often occur singly, and their existence is not suspected until they have been passed, the generality of cases require no sort of medical treatment; but where they give rise to troublesome symptoms, and we have reason to suspect their presence, remedies may be occasionally useful. Thus, insects may be removed from the ears by frequent mild or oily injections ; or, if obstinately adherent, may be destroyed first by sulphureous fume, and then washed out. In the case of insects inhabiting the nose or frontal sinuses, injections of oil or infusion of smoke or tobacco have been recommended : and in the most severe cases, permanent relief has been afforded by trephining the frontal sinus and removing the parasite. The use of purgatives and evacuant enemata need hardly be suggested for the removal of larvæ existing in the rectum.

The *external* parasites of man consist of several species of *pediculus* or louse, the *acarus scabiei* or itch insect, and the *pulex penetrans* or chigoe. Of the pediculus or louse there appear to be three, if not four different species, each attaching itself to different parts of the body. Of these the *pediculus capitis* or louse of the head is the most common. There is also the *pediculus pubis* or crab louse, attaching itself to the hair about the pubes and anus, and the *pediculus corporis* or body louse, which appears to differ, in some respects, from the foregoing. And lastly, the *pediculus ciliorum* or louse of the eye-lash, which is exceedingly rare, and of which we have met with but two examples, but decidedly differing from the other species. These parasites are always easily removed; either by shaving off the hair to which they are attached, or by the use of mercurial preparations, as the common mercurial ointment, or white precipitate in powder, which prove poisonous to these species, and their removal is then easily effected by washing and attention to cleanliness. The symptoms caused by the *acarus scabiei* or itch insect, and its treatment by the local application of preparations of sulphur, which act as a poison to it, do not here need to be described. The *pulex penetrans* or chigoe, is peculiar to warm climates. It penetrates the skin, and there lodges its eggs to the number of about sixty which hatch in this position, and often produce serious mischief. The native inhabitants are very skilful at extracting them, which they do with a needle, taking care not to rupture the little cyst or bag in which they are inclosed, an accident which is followed by the discharge of its acrid contents into the wound, and as a result, an ulcerated sore is formed, often very troublesome to heal.

FORMULARY.

Preliminary Remarks on the Art of Prescribing.*

"Medicus vir prudens prescribat nihil nisi cujus sufficientem queat reddere rationem."
Gaubius.

Difficulty of scientific prescription arising from the extent of knowledge requisite. — Discrimination as to the cases requiring medical aid. — Medicines divisible into simple and compound, officinal and extemporaneous or magistral.—Simplicity of prescription. —Elements of a formula, — the principal ingredient — adjuvant or directive — corrective — rival ingredients — newly developed powers. — Excipient or vehicle, &c. forms of medicines, solid and fluid, powder, electuary, bolus, linctus, pill, mixture. — Drinks, periods at which they should be given. — Arrangement of the several ingredients of a formula. — Errors most apt to occur in extemporaneous prescription. — Domestic measures. — Doses applicable to individual cases, modified by age, temperament, idiosyncracy, &c.

The due selection and adaptation of a remedy to any given case presupposes an accurate acquaintance with the nature of the disease, at least in its relation to external agents, — with its actual stage, and with the strength of the patient — with the influences of age, sex, temperament, and several other individual peculiarities hereafter to be detailed, — with the effects of climate, season, and prevailing diathesis in modifying the constitution, both in relation to the morbid actions going on within it, and also as to its susceptibility to therapeutic agency. A competent knowledge of "materia medica" and of chemistry, of the average effects of drugs, and the marks of their genuineness, of their modes of reaction on each other when combined, and the modification of their effects on the animal system by such union, is no less indispensable.

When the preliminary acquirements are at once so numerous and so complicated, it is obvious that the business of judicious prescription can never become a very simple one, nor one in which even a tolerable degree of precision can rationally be hoped for without much patient study, and ample opportunities for the acquisition of the necessary knowledge. Presuming our reader to have enjoyed and already availed himself of such advantages, our present aim will be confined to fixing his attention on some of the chief objects to be kept in view, if he would render his prescriptions as efficacious, and as little disagreeable either in their form or consequences as possible.

But, before going farther, we would just remind the young pathologist that there are many disorders, in which nature tends to effect by its own unaided powers so rapid a restoration to health, that his interference should be charingly ventured on, or may sometimes even better be dispensed with altogether — that there are others where he must be content to wait and observe, till such time as the symptoms shall have more fully developed themselves, so as to enable him to decide on a promising line of treatment, comforting himself, in the mean time, with the words of the Roman classic, "Medici plus interdum quiete, quam movendo et agendo proficiunt" — that there are others again whose rash removal would almost certainly be followed by the development of some worse form of disease — and finally a vast number of others still, in respect to which, as they are in their very nature incurable, his province is restricted to palliation, or sometimes to the yet more humiliating task of merely sustaining

* For the materials of this portion of our undertaking we have been largely indebted to the works of Gaubius, Murray, Paris, Thomson, Edwards, and Vavasseur, Magendie, Lugol, &c. The methodical treatise of the first named of the above authors, with all its scrupulous minuteness and sententiousness, forms the groundwork of nearly all that has been subsequently attempted in the same department of medical science.

the patient's hopes by the exhibition of medicines of little or no real physical efficacy, and thus preventing that abrupt exhaustion of the nervous energy, and premature winding up of the case, to which utter hopelessness would, when the individual is possessed of little strength of character, inevitably give occasion. But the extent to which the practitioner who is actuated by a high sense of honour and rigid veracity, can proceed in this path, is indeed very limited. Hence the great temporary influence which the unprincipled pretender to science is so often enabled to attain over the weak mind of a sinking patient: restrained by no scruples, he is as ready to act vigorously on the brain and nervous system, through the medium of baseless imaginations and unfounded hopes, as on the stomach, the bowels, or the skin, by more substantial agents.

Whatever may be thought, on strictly moral grounds, of holding out, under any circumstances, hopes which are known to be utterly unwarranted, still a broad line of distinction must be drawn between the individual who does so solely with a view to what he considers to be for the best interest of his patient, and the sordid empiric who is influenced by no other motive than a thirst for gain and ephemeral notoriety.

Medicines are usually divided into *simple* and *compound*. All of the former which are in common use in these countries, and some few of the latter, are *officinal*, that is, are to be had from the apothecary's shop on merely specifying their titles. All such being sufficiently described in our Materia Medica or in our Pharmacopœias, in respect both to their preparation, nature, and applications, we mean to concentrate our attention on such additional compound formulæ, as are most likely to form the subject of extemporaneous, or, as it used to be called, magistral prescription. To give examples of every form of medicines which may be called for in practice would obviously be impossible, their variety being as boundless as that of the individual cases to which they are to be accommodated.

In the construction of a compound prescription, the active or leading ingredient is first to be selected, on the principle of its being at once as mild in its nature and dose, and as little disagreeable in its sensible qualities and effects, as may be compatible with the intention of its administration, or, in technical language, with the indications of cure.

The objects which we have in view, in adding other substances to it, are either to determine its mode of action, to exalt its efficacy, to produce some simultaneous but distinct effect, to correct any disagreeable consequences incident to its use, or finally to bestow upon the medicine a more convenient, permanent, or palateable form. In conformity with these intentions every compound formula was analysed by the older writers into the *basis*, *adjuvans* vel *dirigens*, *corrigens* et *constituens*. It must not however be concluded from hence, that every well-constructed compound medicine must have so many as four distinct ingredients; for one of the added substances may often fulfil two or more of the above conditions. Thus, to take a simple example, if an aperient powder be administered in the syrup of ginger, its disagreeable flavour is to a certain degree masked, its irritating or griping quality counteracted or sheathed, and its laxative tendency co-operated with by the medium in which it is exhibited. So also in the addition of soap to different purgative extracts or powders, their action is at once promoted and rendered more mild, while a proper form or consistency is at the same time given to the mass. In some of our simpler medicines, as, for example, manna and cassia fistula, several of the desired conditions already co-exist; and in certain aperient fruits, which combine under a pulpy form aromatic, acidulous, and saccharine qualities, we are furnished by nature with still more remarkable instances of several of the above characteristics happily combined in one substance.

Simplicity of prescription, so far as it is compatible with the objects just alluded to, should never be lost sight of, as it enables us to calculate more accurately on the effects of our treatment, and to discriminate more readily between the results of the medicine and the spontaneously varying features of the dis-

ease. Superfluous complication tends not only unnecessarily to oppress the stomach, but further, to create a risk of one part of the heterogeneous mixture neutralising the effects of another. This was peculiarly the error of the old prescribers, and traces of it are recognizable down to so late a period as the middle of the last century. Many of the ancient prescriptions, as those for *theriacs*, &c. contained some hundreds of ingredients.

Of the Adjuncts to the principal Ingredient.

1. *The adjuvant.* This may be either similar in nature to the chief ingredient as, firstly, when it is merely another form of the same substance (as, for example, the combination of the tincture, syrup, extract, or powder of a vegetable with its infusion or decoction), the addition being intended to ensure the presence of all its active principles, or to present them in such a variety of forms as will enhance the probability of their taking effect; or secondly, when it is a medicine of different name yet of analogous agency; (ex. gr., ipecacuanha or squills introduced in order to reinforce the emetic agency of tartrate of antimony).

We are indebted to Dr. Fordyce for fixing attention on the fact, that when two or more medicines of similar tendency are united, we may often decrease the dose of each considerably below the half of the usual quantity without any diminution in the amount of the required operation; and that at the same time that the proportional effect is thus augmented in a complex ratio, it is moreover very frequently accompanied with less irritation and distress. It is a principle of which the ordinary formula for purgatives and stimulants afford abundant examples. Even the skilful cook is well aware that it is only from an apt combination of spices that the most agreeable and efficient modification of aromatic flavours can result.

Sometimes the adjuvant seems to exert a *directive influence*, and to determine the organ on which the leading member in the compound shall concentrate its energy. Thus nitre may be to a great degree directed to the kidnies or to the skin, according as it is combined with squill, or with ipecacuanha or guiacum; calomel has its operation more effectually pointed towards the liver and bowels by the addition of a purgative even in very minute quantity, and so forth.

There are other substances again which appear to exalt the effect of the medicines with which they are united, chiefly by rendering the organs for which the latter already manifest a predilection still more susceptible of their influence, and others by merely augmenting the activity of the absorbents. Of one or other of these modes of co-operation we have instances in the effects of the union of mercurials with diuretics, expectorants, and even with some emmenagogues — in the combination of antimonials or acids with saline and other aperients—in the conjunction of powerful stimulants with emetics in cases where the sensibility of the stomach is impaired by narcotic poisons — in the addition of opiates to purgatives in order to affect the bowels in colic from lead and other causes. When the tongue is parched and the skin hot and dry, the administration of expectorants, diuretics, or diaphoretics, commonly proves nugatory till fever has been reduced, and the circulation equalised, by the progress of the disease or some energetic depressing agent, as venesection or antimony; and even purgatives, though they can be brought to bear with more certainty on the bowels than most other medicines on their appropriate organs, are yet often very materially facilitated in their action by the same auxiliaries: that the sialagogue influence of mercurial preparation may be greatly promoted by similar means is notorious. It is a law of very general application that inanition, and the general reduction of the energy of the circulation consequent upon the use of bloodletting, purgation, and low diet, are favourable to absorption, and consequently to the more ready admission of medicinal and other foreign agents into the system.

2. *The corrective.* When the basis is of a nature likely to produce an undue

degree of irritation, so as to run the risk of being rejected by the stomach or passed off from the bowels prematurely, or to cause an unnecessary or injurious amount of pain or uneasiness, it becomes requisite to subjoin some other substance or substances capable of counteracting these evils. Thus for example bitter, saline, and other nauseous drugs will often lie easily even on delicate stomachs, on the addition of a small portion of an aromatic powder or tincture, a dilute mineral acid or other stimulant. Turpentine is more readily retained and has its disagreeable flavour in some measure concealed on combination with red pepper. The addition of a drop or two of hydrocyanic acid, or a proportional quantity of laurel water to a mixture, will occasionally subdue its sickening taste, and the stomach is sometimes very effectually prepared for tolerating a nauseous medicine by the previous exhibition of a small opiate or a potion containing two or three drops of the dilute acid just named, or of creasote. Castor oil may be conciliated with some irritable stomachs by exhibiting it in emulsion flavoured with syrup of Tolu and compound spirit of lavender, or in hot coffee, or in union with the compound tincture of senna, or an aromatic distilled water, or simply by chewing a slice of lemon immediately before and after it is swallowed. Trifling as these circumstances may appear, we may often be indebted to them for being able to avail ourselves of a sickening though otherwise very valuable medicine.

Certain purgatives are rendered more mild and satisfactory in their operation by careful trituration with less active ingredients, saccharine pulps, mucilages, or gritty and absorbent powders. Even gamboge, after being rubbed up assiduously with an inert and insoluble powder, is less apt to nauseate or gripe, probably from its facility of solution being somewhat retarded, and the medicine being thus prevented from expending too much of its power in a concentrated form on any one part of the mucous membrane: for in respect to the solubility of drastics there appears to be a happy medium, which, by promoting their equable distribution over the several successive tracts of the alimentary canal, diminishes the risk of excessive local irritation. The addition of spices, and in some instances of a narcotic, is also a very effectual means of obviating griping and flatulence, no less than the well-timed administration of diluents and demulcent drinks.

The successful exhibition of diuretics and diaphoretics likewise depends in a great degree on their being adequately guarded by judicious combination, for when they violently excite the intestinal canal their specific effects on the kidneys and skin are apt to be greatly impaired or lost entirely.

The addition of opiates to mercurials, and to preparations of iodine in order to prevent their producing injurious excitement of the mucous membrane and running off prematurely by the bowels, is a familiar instance of the same principle. The occasional disagreeable effects of opiates, in their turn, are remarkably modified by the addition of vegetable acids and aromatics; those of colchicum by magnesia, and of antimonials, which are prone to act too violently on the stomach or bowels if acidity be present, by the union of the volatile or one of the fixed alkalies.

3. *Concurrent or rival* ingredients, intended to produce simultaneously very dissimilar effects. Such combinations are made where it is desirable immediately to fulfil two or more distinct indications, without, at the same time, burthening the patient with any unnecessary repetition of the disagreeable act of swallowing medicine.

We have examples of this kind in the frequent union of tonics with purgatives, where we wish at once to produce free evacuations, and to sustain the tone of the system at large, and of the stomach and bowels in particular;—in that of tonics with anthelmintics, where we have the joint object of expelling the parasitic animals already existing, and of so invigorating the digestive organs as to prevent their reproduction;—in that of antispasmodics with expectorants in asthma, where it is desirable at once to relax spasm, and to procure

free secretion; — in that of stimulants and tonics along with diuretics (and especially along with such as are of a very depressing nature), in dropsies occurring in phlegmatic habits, and associated with marked debility; — in that of opiates with aperients, where it is necessary to keep the bowels open, whilst we are endeavouring to procure sleep or to ease pain; — in that of diaphoretics with astringents, where we would simultaneously determine to the skin, and control a superabundant mucous secretion from the intestinal canal; — in that of aperients and antacids along with diffusible stimulants and tonics, in dyspepsia, where acidity and constipation so often coexist with flatulence and debility of the system at large; — in that of alkalies with vegetable astringents, bitters, and anodynes, in cases where the lithic diathesis is complicated with irritation of the vesical mucous membrane and feeble powers of digestion; — in that of warm stimulants, as myrrh or some of the terebinthinate class, along with astringents (sulphate of zinc or uva ursi, &c.), in chronic catarrh of the aged. In short it would be quite useless to attempt to enumerate all the instances of this class which are daily occurring in practice; for under it, in fact, fall nearly all the nicer adaptations of extemporaneous prescription to individual cases. It is here too, especially, that the young practitioner incurs the greatest risk of being tempted into a hazardous degree of complexity in his combinations, or of attempting to reconcile inconsistent indications. Embarrassments of this kind may often be avoided by an enlightened diagnosis, and by patiently tracing up the diversified symptoms to a common root, against which almost every effort should be concentrated. Struggling with the several merely functional derangements in detail, to the neglect of their organic source, is something worse than mere trifling. "Nous croyons avoir demontré (says Rostan) que la plus dangereuse des médicines était celle des symptômes.

4. *The union of two ingredients of diverse nature, with a view to the formation of a compound of totally new powers, or to the evolution in an active form of an element which was previously inert.* In the powder of ipecacuanha and opium, though merely an instance of intimate mechanical mixture, we recognise a remarkable alteration of properties, the nauseating tendency of one of the ingredients and the narcotic quality of the other being in a very considerable degree merged in the resulting diaphoretic tendency.

But by far the most striking exemplifications of such transmutation are to be found in the union of substances which react on each other chemically, and thus form a compound possessed of qualities entirely unlike that of either of its constituents, or else evolve in an energetic state one or more of the elements which had previously existed in a neutralized condition. Thus from the combination of vinegar with ammonia there results one of our mildest and most useful diaphoretics. From the action of a salt of iron on the carbonate of an alkali, we obtain this valuable metal in one of its most energetic tonic forms, being that in which it seems most readily taken up by the absorbents, and to exercise the most marked influence on the system, as in the well-known Griffiths's mixture, in which further, the proto-carbonate is not only suspended, but for a time enabled to maintain itself unaltered in the fluid, by means of the myrrh in its composition. By the addition of lime water to calomel or to corrosive sublimate, we obtain respectively the very useful and comparatively mild preparations so well known in our hospitals by the names of the *black* and the *yellow wash.* On the combination of the citric or tartaric acid with the carbonate of an alkali, a gas is evolved of a nature slightly stimulant to the stomach, giving an agreeable briskness to draughts, and checking nausea; or if the carbonate of magnesia be substituted, we obtain in addition a valuable aperient. So, likewise, on the mixture of yeast in a poultice, the vegetable matter enters into new combinations, and evolves carbonic acid in the form of an useful antiseptic. And to mention one more example, from our comparatively inactive common kitchen salt. there is poured forth, on the addition of the oxide

of manganese and sulphuric acid, that energetic corrosive, chlorine gas, which is possessed of such powerful disinfecting qualities.

5. *The excipient or vehicle.* It is often necessary to introduce certain substances of very inferior activity, in order to give an eligible form to a compound. And here two considerations must be kept in view :— 1st, what form will give the most efficacy to the active ingredients we are about to administer; and 2dly, in what condition will they prove least repulsive to the individual patient for whom they are intended. When both of these objects can be conciliated, the prescription, supposing its other ingredients to have been judiciously selected in reference to the particular case, may be pronounced complete; but when either must give way to the other, it should obviously be the latter, except perhaps in the case of very young and unmanageable children, or very wayward adults who cannot be prevailed on to swallow any medicine which is at all of a disagreeable form. In the flavouring of medicines for infants we may generally be very liberal in the use of syrups or sugar ; but to many grown up people, and perhaps especially to those of an hypochondriac and hysteric tendency, a very sweet taste is often disagreeable, and, in place of concealing the unpleasant qualities of a drug, often renders them only more obvious and revolting by the contrast. Acids are, when admissible, much more effectual in reconciling the palate to several kinds of nauseous medicine.

The precise effect of most medicines is modified in a very striking manner by the degree of solubility. This is well seen in regard to some resinous purgatives and aloes, which in their uncombined state, being of very slow solubility, scarcely begin to act till they have reached the lower portion of the intestinal canal, but which have their operation remarkably accelerated on being united with soap or an alkali which enables them to dissolve more readily, and become more equably diffused over the whole length of the mucous membrane; after such addition, they not only procure fuller evacuations, but are less apt to gripe or to give rise to irritation of the lower bowels. The same beneficial results may often be obtained by exhibiting them in fluid mixture, and especially with saline and other aperients of speedy action.

The efficacy of the vegetable tonics and astringents is frequently much promoted by combination with an alkali; and though this is ascribable mainly to the beneficial action of the latter on the mucous membrane, and to its obviating any ascescent tendency which may exist in the primæ viæ, a part of its good effect has been supposed, and reasonably so, to originate in the greater degree of solubility which such additions bestow on their resinous and extractive principles.

It is only by a reference to chemical considerations that we can ascertain what form of a medicine is likely to present in the most energetic form those qualities of a substance of which we would wish chiefly to avail ourselves. Thus water applied in the manner either of cold or warm infusion or decoction is the most appropriate menstruum in relation to some principles; alcohol in a more or less dilute state to others ; wine or acids to others ; and even syrups or honey, though generally speaking very feeble solvents, have yet in some few cases a peculiar suitability. Often it is only by evaporation, and concentration into the form of an extract, that we can obtain the desired substance in its most permanent and active, and yet also its most manageable shape. And after all, there are still many instances in which we cannot make sure of the full effect of a medicine by any one of these processes, and, in order to have the benefit of all its varied powers, are forced to combine the results of all, or else to exhibit it in substance. In the latter instance, where there is imperfect solubility and considerable hardness, we are commonly obliged to adopt the pulverulent form.

In respect to *powders*, it is often by no means indifferent how far the process of pulverisation is carried, as they vary materially in their effects, according to the state of mechanical subdivision to which they are reduced. The further this is carried in respect to substances whose active principles are not volatile,

nor prone to be injuriously acted upon by atmospheric air, the better in general will they fulfil their object. But there are many others, such as bark, rhubarb, and spices, and those whose aromatic properties are prone to evaporate, or whose extractive matter has a strong affinity for oxygen, which prove more efficient, and retain their virtues longer in a somewhat coarser condition.

Powders may be exhibited either in water or some other convenient fluid, in syrup or mucilage, confection, panada, honey, or sugar, in most instances according to the choice of the patient: but in the case of metallic and other heavy and insoluble powders, the advantage of a thick and viscid vehicle to prevent their subsiding to the bottom of the containing vessel, and thus being in great part lost, is obvious. Those of an acrid or mechanically irritating nature demand a similar medium. When insoluble powders of a very different specific gravity from the fluid in which they are exhibited form part of a mixture, the phial should be directed to be carefully shaken before each dose, to prevent the inequality which would otherwise ensue from their sinking in large quantities to the bottom, or floating in undue proportion on the top; a precaution equally necessary in the case of the addition of very light or volatile liquids, which have not a strong affinity for the menstruum. Powders may vary in weight from a grain or two to a drachm to the dose, but should rarely much exceed the latter quantity, as they are otherwise apt, especially if of low specific gravity, to become repulsive or nauseous by their mere bulk. Where powders of an insoluble nature are exhibited for a considerable period continuously, it is prudent to administer from time to time an aperient to preclude the chance of their accumulation in the intestines. Even magnesia is not exempt from this risk, and has been known to form dangerous concretions in the colon from the neglect of the above precaution, and from its having been given in quantities too large for the acid present in the stomach and intestines; for when this is sufficiently abundant, the magnesia is dissolved, forms a laxative compound, and so ensures its own expulsion. When powders are made up by the apothecary into a soft paste with conserve of roses, aromatic confection, lenitive electuary, or some vehicle of similar consistence, they constitute the *bolus*, a form of exhibiting medicine particularly disagreeable to some patients from its appearance, as well as from its viscidity causing it to adhere to the teeth and prolong the unpleasant flavour. In size it may vary from half a drachm to a drachm: the details of its preparation are generally consigned to the apothecary. The *electuary* is commonly made up in larger quantities, several doses in one vessel, and is of a softer or creamy consistence, its active portion generally consisting of a powder, and in some instances of a terebinthinate or balsam, mixed up with syrup, treacle, honey, or the pulp of fruits, and flavoured or corrected by the addition of the powder of some of the aromatic roots, barks, or seeds, or of a small portion of an essential oil. The dose varies from a half to two or three tea-spoonsful. The *linctus* (looch or eclegma) for lubricating the lining membrane of the mouth and fauces is made generally of a still thinner consistence, or about equal to a syrup in density; and is composed for the most part of spermaceti or some other oily substance along with mucilage or yolk of egg, syrup, sugar, or honey, to which more active ingredients, sedatives, expectorants, &c. are occasionally added in inconsiderable quantities. Two or three ounces of the compound are usually ordered at a time, of which the patient is directed to take up frequently a small portion on the point of a spoon or of a stick of liquorice, and to allow it to diffuse itself slowly over the mouth and throat. It is a form of medicine now comparatively seldom adopted.

The *pillular* form, much more used than either of the preceding, is peculiarly applicable to such medicines as exist in a very concentrated state, and to those which from considerable specific gravity and difficult solubility are unfit for exhibition in the fluid form, or from their glutinous tenacity are not susceptible of pulverisation. It is also very suitable where it is desirable to conceal as much as possible a disagreeable smell or flavour, or to retard the operation

of the medicine for some time after it has been swallowed; both of which objects may be still further promoted by involving each pill in a sweetish or inert powder, or in gold or silver leaf, or, as has been ingeniously practised in regard to copaiba, by enclosure in a gelatinous capsule,—a piece of refinement, however, to which it is rarely requisite to have recourse. We must not indeed aim at too far diminishing the solubility of pills: of some of the ill effects so originating we have already spoken; and may add here that when of too firm a consistence, they have often been known to pass quite through the bowels without ever being dissolved or producing consequently any of the effects for which they were given; as was frequently the case with the Plummer's pill of a former pharmacopœia. Mucilages, syrups, extracts and confections are used for binding their ingredients together, where not already of a suitable consistence, and when the mass proves too liquid, this may be readily corrected by the addition of liquorice root, magnesia, flour, or some other inert powder. The addition of a fractional portion of some warm essential oil, or aromatic substance in powder, is generally made to prevent nausea, tormina, and flatulence, as well as to conceal any disagreeable taste or odour. Pills which are made up with treacle are amongst the least apt to become indurated, but there are scarcely any which have not their qualities impaired by very long keeping. The form of pill and of bolus are unsuitable for young children.

The liquid form is particularly suited to such medicines as it is desirable should produce a rapid effect, and more especially if they are not of a very disgusting flavour. But to all such rules there will be numerous exceptions: thus in some cases of poisoning (as by the vegetable narcotics for instance) where emetics are necessary, though an instantaneous operation is indispensable, the fluid form is often not the most eligible; and if we are obliged at length to have recourse to it, from the failure of emetic powders or boluses and the impossibility of procuring the stomach pump, the quantity of liquid employed should still be small, and of the kind least likely to promote the solution, or favour the absorption of the deleterious substance. If there be any thing within reach which is known to be capable of entering into combination with the poison, and forming an insoluble or comparatively uninjurious compound with it, as is the case with some of those belonging to the mineral kingdom (as common salt with nitrate of silver, Glauber or Epsom salts with the muriate of barytes or with sugar of lead, the tritoxide of iron with arsenic), it should immediately be administered and repeated in every portion of fluid swallowed.

In the preparation of fluid medicines the menstruum should be selected in reference to its power of co-operating favourably with the chief ingredients in the formula, and of correcting, as far as may be, any disagreeable qualities they possess. With such views the infusion or decoction of a vegetable is often made the medium of administering its powder or extract; camphor mixture or some aromatic water is added if it should have a tendency to sicken or gripe; or if very acrid, it is exhibited in almond emulsion or some other bland fluid. An effervescent form is, as we have already seen, a very advantageous one for the exhibition of some medicines which are apt immediately on their being swallowed to derange the stomach or to depress the vital power; but we must take good care that the ingredients are all compatible with each other, or such decomposition might otherwise ensue as would altogether frustrate the object of administration. In this manner colchicum, tartarised soda, opiates, and some other substances, are often given.

The disgusting flavour of the carbonate of magnesia, whether solid or in solution, is in a great measure subdued by exhibiting it in an effervescent state along with lemon juice or an acidulated syrup, taking care however that the acid shall be in minor proportion in cases where we wish to obtain the benefit of the antacid no less than of the aperient virtues of the medicine.

Where *dilution* is requisite during the operation of a medicine it is by no means indifferent at what period it is resorted to. Thus, supposing it is our

aim to produce a diuretic effect, and that the medicine selected for the purpose should also be possessed of diaphoretic or cathartic qualities, drinks should be withheld for an hour or two after its exhibition to allow time for its being absorbed and carried to the kidneys; for if the patient be prematurely deluged with liquids, the diuretic principle would probably be hurried off by the bowels; or, supposing the body to be kept very warm by an injudicious accumulation of coverings, the medicine would in all likelihood expend its whole energy on the cutaneous exhalants, and so our original object be totally frustrated. Thus again, after the swallowing of a medicine which contains nauseating ingredients (as, for example, Dover's powder), and which it is desirable to have absorbed, or at least to have retained long enough to allow of its producing its peculiar effects on the skin, we should beware of immediately over-distending the stomach with tepid drinks, which, however useful auxiliaries an hour or so later, are, if given at this period, very apt to produce an emetic effect. It is not however our object to enter here at length into the subject of the drinks of the sick, and we would merely remark before quitting it, that those of an acid quality, as well as all fruits and other substances of an ascescent tendency, should be avoided during the exhibition of calomel and such other medicines as have a tendency to produce irritation of the mucous membrane — a state in which mucilaginous diluents, such as rice water, thin arrow root, or barley water, infusion of linseed, or decoction of marsh mallows, or solutions of gum or of isinglass, taken frequently and in small quantities at a time, are the most appropriate drinks; and so likewise where irritation of the urinary organs exists; — that to promote diaphoresis, the thinnest diluents, such as whey or tea, drank very hot, are the most suitable; — to favour the action of the kidneys in dropsy, imperial (a solution of cream of tartar flavoured with lemon and sugar), a decoction of broom tops, or an infusion of juniper berries, may be used freely, as they often lend effective aid to more powerful diuretics; — and finally when we would facilitate the operation of emetics, tepid fluids, such as the infusion of chamomile, or water having a little flour of mustard diffused through it, or even tepid water alone, drank in large quantities and at short intervals, are, by the distension and nausea which they cause, very important auxiliaries.

The order in which the several ingredients in a prescription should stand is generally determined by a joint consideration of the relative importance of their operation, of the similarity of their nature, and of the succession in which their combination may be most scientifically effected. Thus the vehicle or menstruum should commonly be placed next after the substance in reference to which it is specially chosen. Substances which would be injured by heat should be postponed to those requiring infusion or decoction, and this is especially the case with regard to volatile and aromatic ingredients (ammonia, tinctures, ethers, terebinthinates, and spices, &c.), of which the active principles would be in great part, if not entirely, dissipated long before the other more fixed ingredients were ready for use. The mineral acids should, for the most part, be added to the menstruum, as their immediate contact with the other substances in an inadequately diluted form would often lead to the destruction of the very qualities for which the latter were selected; in some instances however they are intended to be applied in a somewhat strong condition in order to facilitate the solution of obdurate materials.

Of the Errors most apt to occur in Extemporaneous Prescription.

These are referrible to the following heads.

1. *Ordering substances to be combined, which are by their nature incapable of uniting*, as oleaginous, balsamic, or resinous substances in an infusion, decoction, or lotion, without any common bond of union, as mucilage, yolk of egg, an alkali, &c.; or calomel or other heavy and insoluble powder in an aqueous medium, &c.

2. *Prescribing a particular form for the compound, which its ingredients, when*

brought in contact, are incapable of assuming or preserving — as the pillular, when the ingredients have too little cohesion or solidity (here the additions alluded to in a former paragraph will often do away with the difficulty); — ordering a powder where the substances, though themselves perhaps pulverulent, melt on being intimately mixed, as is the case with Glauber salt on being triturated along with carbonate of potass, crystallised alum with sugar of lead, or myrrh with a crystallised alkaline salt, and other such instances where the water of crystallisation is set free in sufficient quantity for the solution, or at least for the moistening of the new compound.

3. *Directing a dose of greater bulk than can conveniently be taken at one time;* thus ordering pills of a size difficult of deglutition, powders of an irritating nature without pointing out the necessity of enveloping them before they are swallowed in some sheathing medium, or taking after them an appropriate diluent or mucilaginous drink, or protecting the stomach from their concentrated action by premising a light meal, as is so requisite in the case of arsenical and some other corrosive metallic preparations, tincture of cantharides, &c.

4. *Ignorantly ordering substances to be combined which react on each other, so as to produce new compounds of qualities totally dissimilar from those of which the prescriber had intended to avail himself,* as for instance the union of the diacetate of lead with the sulphate of alumine, or with the compound infusion of roses or the sulphate of magnesia, when he wishes for a powerful styptic medicine; the combination of alcoholic tinctures, ethers or acids, in large proportion along with mucilages and emulsions; lime water, alkaline carbonates, bitter and astringent vegetable infusions or decoctions along with metallic salts, as the sulphate of iron, nitrate of silver, &c. of the astringency of which he wishes to have the benefit; Goulard in large quantity in mucilaginous lotions, or astringents with isinglass, &c. But it would be endless to attempt to enumerate all the errors of this kind, to which an ignorance of chemical affinities may give rise: for such farther details on the subject as may be very commonly required for the direction of the prescribers of medical substances we must refer our readers to such tables of incompatibles as that affixed to the last edition of Dr. Thomson's *Materia Medica*, and before leaving the subject, merely recal to their memory the law, of very extensive application, announced long since by a distinguished French chemist, namely, that if solutions of two salts containing elements within them capable of forming a soluble and an insoluble salt, be brought together, a decomposition must necessarily take place; as, for example, when the nitrate of silver and common salt are mixed, the result being the precipitation of the muriate of silver, whilst the nitrate of soda remains in solution. Still however it must be confessed, there are many instances of medicines of an apparently very unchemical nature doing good service in the treatment of disease, and here of course the dictates of theory must yield to those of experience. Such exceptions at the same time can never warrant the young practitioner in blindly ordering combinations which are at once unscientific and untried.

5. *Directing a mode of preparing the ingredients which is injurious to their qualities or unsuited for the development of their full powers.* Thus, as we have already seen, some vegetable matters which are very efficient when given in substance or even in the form of cold infusion, may lose nearly all their virtues by long-continued coction, which evaporates their essential oil, and oxidizes and precipitates their extractive matter often in an inert form. To take a familiar example of the injurious influence of protracted exposure to heat, the leaf of the cherry laurel, which is used in our kitchens to impart an elegant flavour to various preparations of milk, has its peculiar properties entirely dissipated if long boiled. Some vegetable preparations are rendered on the other hand more irritating by much boiling, as senna, which has its griping tendency thus much increased.

An opposite error to that just alluded to is the ordering the form of infusion, instead of that of decoction, for a vegetable whose mucilaginous or astringent

qualities we would obtain, in the largest proportion, in solution. Another is the selection of an inappropriate menstruum, as an aqueous one for vegetables whose resinous or balsamic qualities we would fully extract, or an alcoholic one for the solution of gummy matter or isinglass. With the gum resins indeed a kind of emulsion is formed with water by means of trituration, but even here a deposition speedily begins to take place, indicating the necessity of their being freshly prepared for use.

6. *Omitting the proper directions for the preparation or use of a medicine.* An oversight may also be committed in respect to not directing the precise part of a plant which we wish to subject to preparation, in case that it be one foreign to our pharmacopœias, — or whether it should be bruised or otherwise comminuted before being exposed to the action of the proper menstruum — the omitting to mention how long maceration should be continued — whether straining is requisite, and similar details. It is true the apothecary, supposing him a well instructed one, may be capable of supplying all these oversights, but it is not less the duty of the prescriber, in uncertainty as to what hands his formula may fall into, to define such points with sufficient minuteness and accuracy. The time of day at which the medicine should be taken, as well as the intervals of the dose where repetition is requisite, and the quantity, should not be omitted. Nor should it be forgotten that the nature of the menstruum, quite independent of the strength of the active ingredients, must often limit the extent of the dose. Thus the quantity of a tincture should rarely exceed a drachm or two at a time. When it holds a narcotic or acrid substance in solution, as opium or cantharides, the dose will of course be very much less than this. The stimulant character of such a vehicle renders its habitual use in many chronic cases objectionable, even in a tolerably dilute state, and in acute disease often altogether inadmissible, especially in the case of children and others unhabituated to vinous fluids. The advantages attendant on their addition in some cases to infusions and decoctions, in causing them to agree better with delicate stomachs and to keep somewhat longer unimpaired, have already been alluded to — circumstances which, together with the fact of certain principles being soluble in them only, and the comparative permanence of their composition in different climates and seasons, must ever give them a high value when judiciously used. At the same time it must be confessed that their habitual misuse, and that too even under medical sanction, has in too many instances laid the foundation for lamentable intemperance. Tinctures made with alcohol in a concentrated form are liable to deposit a portion of their ingredients on the addition of water — an inconvenience from which those in whose preparation a weaker spirit (as proof spirit) is employed, are free.

The quantity of an infusion or decoction ordered at one time should, in consequence of their liability to spoil, rarely exceed from six to eight ounces, except in the case of those of which the dose is unusually large, as, for example, the decoction of sarsaparilla. The quantity ordinarily prescribed at each dose (with the exception of such as contain an acrid or narcotic principle, as digitalis, dulcamara, or Geoffroya for instance,) varies from one to two or three ounces. When too much is taken at one time, they are apt to oppress the stomach, an inconvenience which is to be avoided by diminishing the dose and increasing the frequency of its repetition. Three, four, or six hours are very common intervals; but these of course vary with the nature of the medicine and of the precise effect we would obtain from its use. As a general rule, infusions are less disagreeable, and sit lighter on the stomach than decoctions, as the former retain more of any essential oil which may happen to enter into the composition of the vegetable matter employed,— and the lower the temperature employed, the more truly does this hold, — but, on the other hand, they are in many instances feebler in their action.

Whether the form of mixture or draught should be selected for a medicine, depends much on whether very great accuracy in the dose is important. When the ingredients of a mixture are in kind and quantity sufficient to produce a

poisonous effect, the subdivision into separate phials, each containing a single draught, is at least a prudent precaution. It is more especially necessary where any of the ingredients are either of a very heavy or very light nature, as, from inadvertence in respect to forgetting to shake a larger bottle, the distribution of the doses might be very unequal, Such subdivision is also advantageous in the case of very volatile medicines, which are apt to be in a great degree dissipated on very frequent removal of the cork. But the degree of prudence and attention which the attendants display, and the relative importance of economy in small matters to the patient (especially when the subject of a protracted malady), will of course, in some degree, influence us in respect to this and many similar minor points.

In neat prescription, the several items are generally so proportioned, as that, when all are added together, they shall form an even weight or measure. This at once aids the memory in retaining the proportions, and in the case of a draught or mixture adapts it for filling one of the ordinary-sized bottles, these being made according to a fixed gradation of sizes—1, 2, 4, 6, 8, 12 ounces, &c. Strict adhesion to this point is, however, obviously of very secondary consequence, and is very often dispensed with. Again, it is very convenient that where several doses are ordered together, the active ingredient in each dose should be a submultiple of the whole quantity of it,— or, in other words, that the latter should divide without a fraction. Thus we always know precisely, and easily retain in memory, the exact portion taken at a time: for example, if we wish to exhibit calomel in divided doses, it will be more natural and suitable to direct twelve grains to be apportioned into four powders, than ten into three, though the actual difference in the strength of each dose is so trivial. This, to be sure, is a simple matter, but every tyro is not fully aware how much attention to such trifles facilitates practice.

In composing a prescription, it is best for the beginner to commence by determining the quantity of each of the more active ingredients for a single dose; then that of the adjuncts corrective and recipient; and finally, multiply each separately (or, if he please, leave it to the compounder to do so), according to the number of doses, pills, powders, or draughts he wishes to have made up at once. Thus errors will be less likely to arise, than where the larger quantity is first fixed upon, and its subdivision subsequently performed, as usually practised by the more experienced prescriber.

In popular recipes great incorrectness of quantity is liable to arise in consequence of the troy, or apothecaries' drachm being so very much heavier than — above double— the drachm avoirdupois; and consequently the apothecaries' ounce also, though it contains just half as many drachms as the ounce avoirdupois, is heavier than it.* Whereas the troy pound on the contrary is the lighter of the two†, there being four ounces less in it. The confusion and inexactness to which all this may give rise in ignorant hands is obvious. Even careless apothecaries, who sometimes use troy weight for nothing above a couple of drachms, are liable, from the same cause, to commit great errors, and the more especially so as the druggist sells every thing to them by avoirdupois weight,

Powders should rarely be ordered in large quantities at once, as many of them, as, for example, bark, rhubarb, guaiacum, &c. are materially injured by the action of the atmosphere and light; there are in fact but very few medicines which, like mercurial ointment, can be said to improve by keeping. The dose of most of the powders ordered in our pharmacopœias, vary from five to ten grains. Even in respect to *bulk* alone, a powder, especially of any light vegetable matter, becomes inconvenient where it much exceeds a drachm. Cinchona is one of the few which it may sometimes be requisite to take in larger doses; though the occasion for this has been of late years almost entirely done

* Somewhere about one tenth. For their precise relative values, see the very useful tables in the late Dr. Duncan's Dispensatory.

† By somewhat more than one sixth.

away with, by the discovery of quinine. Many of our most active remedies, sepecially the alkaloids of recent introduction into practice, exist in the pulverulent form, and are not included in the above remarks, their dose being, for the most part, only the fractional part of a grain.

The following table of the *average* quantities of different forms of medicine, and of certain of their adjuncts usually directed, may prove of some assistance in the art of prescribing.

DRAUGHT—from one ounce to two or three ounces.

PILL—three to five grains. (Narcotic pills are often left much smaller than this, even after the addition, occasionally made to the active ingredients, of some comparatively inert powder or extract to augment its bulk.)

POWDER—five grains to a drachm. (Calomel and some other active powders are often made up into powders of much smaller bulk than even the first of these quantities.)

BOLUS—a scruple to a drachm.

ELECTUARY—each dose from half a drachm to two drachms. (The whole quantity ordered at a time from two to four ounces.)

TINCTURE —the quantity usually added to infusions, decoctions, &c. to qualify them, varies from half a drachm to a drachm and a half to each fluid ounce.

SUGAR — half a scruple to a scruple to every ounce of a mixture or draught when it is requisite to sweeten them.

SYRUP — simple — half a drachm to a drachm and a half to each ounce of a mixture or draught. The latter quantity would render them too sweet for many palates. To conceal the flavour of children's medicine, a still larger proportion is sometimes added. Of syrups containing active ingredients in solution, the ordinary dose is from one to two or three drachms.

HONEY — two parts to one of turpentine, &c., to form an electuary. Dry powders will require a larger proportion; a simple or compound syrup or treacle may be substituted, thickened if necessary with powdered liquorice and a portion of compound powder of cinnamon.

GUM-ACACIA IN POWDER — two drachms to suspend an ounce of oil, or a drachm and a half of the resin of guaiacum, &c., in water in the form of emulsion; half a drachm to each ounce of fluid for a cough mixture; from half an ounce to an ounce for each quart of water for a mucilaginous drink, to be taken *ad libitum* in irritation of the stomach, bowels, and urinary organs.

MUCILAGE OF ACACIA — one to two drachms to each ounce of fluid for a cough mixture, &c. Six drachms to an ounce of olive or other fixed oil to form an emulsion with water; or to suspend a drachm and a half of resin of guaiacum or of balsam of copaiba along with a couple of drachms of sugar in an eight-ounce mixture. The yolk of one egg is a good substitute.

TRAGACANTHÆ GUM — four or five grains render an ounce of water mucilaginous.

SOAP — a bitter extract, or a confection — about one part to two or three parts of most powders to form a mass for pills.

POWDERS (cinchona, &c.) — from a scruple to half a drachm to each ounce of a mixture.

AROMATIC POWDERS — five to fifteen grains added as a corrective to other powders, bolus, or draught.

AROMATIC CONFECTION — one to two scruples to a bolus or to a draught of two ounces, and proportionably to a mixture.

ESSENTIAL OILS — ♏ $\frac{1}{6}$ to ♏ $\frac{1}{3}$ to a pill; ♏ ii — vi (to be dropped on sugar ʒ i—ii, and rubbed up gradually with water) for a draught, or imitation of the distilled water of the same name.

Domestic Measures.

Medicines are often directed to be taken by the full of a *cup*, *glass*, or *spoon*, The quantities so indicated are too vague to be suited for the dosing of active remedies.

A *teacupful* is generally supposed to be equivalent to four ounces of an aqueous fluid.

A *wineglassful* is generally supposed to be equivalent to an ounce and a half.

A *tablespoonful* is generally supposed to be equivalent to half an ounce.

A *dessert spoonful* is generally supposed to be equivalent to two drachms.

A *teaspoonful* is generally supposed to be equivalent to one drachm of water; but of course to a considerably smaller weight of ether, or of an alcholic tincture and other fluids of a specific gravity much inferior to that of water; and the reverse in respect to nitric and sulphuric acids and other fluids of higher specific gravities.

A teaspoonful of a heavyish powder contains about half a drachm, as sulphur for example.

A teaspoonful of a very light powder (as magnesia), about ten grains.

But to show still further how very indefinite such methods of measurement are, we may mention that we have found an evening teacup, of the medium size, when full up to the brim, to contain six ounces; or when of the ordinary degree of fulness, so as to be easily handed without risk of spilling, about four and a half ounces or five ounces.

A *breakfast teacup*, when filled quite to the brim, contains above twelve ounces; when filled to within half an inch of the brim, only eight ounces.

A *coffee cup*, when filled to the brim, contains about five ounces; when of the ordinary degree of fulness, about four ounces.

A *wineglass*, when filled to the brim, contains about three ounces; or when of the ordinary degree of fulness, about two ounces.

In French clinical reports, "*un verre*" represents about four ounces.

A *drop*, a *minim*, and a *grain weight* of a fluid are, when great exactness is not required, generally considered as equivalents. Measuring by the *minim* or sixtieth part of a fluid drachm, as now very commonly adopted, has a great advantage in respect to equability over the old method by drops, these varying in size, not only with differences in the lip of the vessel and mode of dropping, but also with the nature of the fluid.

The *manipulus* of the older writers stood for about half an ounce, being a handful; the *pugillus*, for a quantity which could be taken up by the thumb and two first fingers, or about a drachm, or the fourth of the manipulus.

On Doses as applicable to Individual Cases.

The determination of the dose depends on a great number of joint considerations—the precise object we have in view in its administration—the frequency of its repetition—the age, sex, temperament, idiosyncrasy, and habits of the patient—the period of the disease and state of the general strength—the condition of the stomach and intestines in particular, and in some cases also that of the heart, brain, and urinary organs, as well as of the uterus—the influence of climate, season, and prevailing diathesis—and finally the chances of varying strength in the medicine.

The object in view in the administration of the medicine. Difference of dose often materially modifies not only the degree, but often the very nature of the effect produced by a given medicine. Thus, for example, *camphor* which in small doses is stimulant and antispasmodic, in large ones is apt to be emetic, or, if retained in the stomach, may prove alarmingly narcotic. All this holds good in a minor degree of *nutmeg* also. *Opium*, which when given in small quantities and frequently repeated has generally, and especially

in debilitated states of body, an exciting action in a very marked degree, proves in full doses most powerfully narcotic. The *neutral salts*, which in moderate dose are amongst our commonest aperients, in very large ones are emetic, and in small ones act for the most part on the kidneys. *Turpentine*, when administered in small doses, as from a scruple to a drachm, is apt to excite urinary irritation; yet in full doses, as from half an ounce to an ounce, especially if combined with castor oil or olive oil, it passes off freely by the bowels, without producing, for the most part, any such disagreeable effect. *Antimonials*, which in fractional doses act on the skin and facilitate expectoration, in large ones vomit, and purge, and reduce in a remarkable degree the strength and frequency of the pulse, and the vital energy generally. *Ipecacuanha* varies in its effect in relation to the dose in a very similar manner, save that it does not produce such formidable depression; whilst in small quantities it has in addition even a tonic and stomachic effect, as in dyspeptic cases, and is equivalent to an astringent in dysenteric ones.

Calomel in large insulated doses has a powerfully purgative and probilious effect; in smaller and frequently repeated ones it salivates and acts on the system at large. Such, at least, is the general difference of result in relation to its doses, though exceptions do not unfrequently occur, a large single dose sometimes affecting the constitution, whilst small and reiterated ones are apt at length to act powerfully on the bowels. *Tobacco* in minute doses is diuretic, whilst in somewhat larger ones it has a deadly sickening and narcotic influence, depressing with fearful rapidity the powers of life. And to give one more instance:—*Rhubarb*, which in the quantity of from a scruple to half a drachm is such an effectual purgative for an adult, in doses of four or five grains displays invaluable stomachic properties. From all this the absurdity of the vulgar is obvious, who when pleased with the effects of a medicine think to augment its utility in proportion as they swallow it in larger quantities. Large doses of most active substances produce so great a degree of local irritation, as either to cause their speedy expulsion from the stomach and bowels, or, at least, to diminish materially the chances of their being taken into the system or of permanently modifying the action of the parts with which they come in contact. A repetition of small doses at short intervals affords, generally speaking, the best chance of absorption. Even where the augmentation of an evacuation, or its reproduction when altogether suppressed, is our object, the doses of the appropriate medicines should be moderate, and especially so in very chronic diseases, as otherwise they exhaust for a considerable period the excitability of the organs on which their influence is directed, and are often followed by a still greater deficiency of secerning energy, and produce in the system at large an alternation of irritation and exhaustion very unfavourable to the re-establishment of healthy actions.

Age. Persons of adult age and in the vigour of life generally require the largest doses. For the old, some diminution ought commonly to be made. In infancy, childhood, and youth, the dose is somewhat, but not exactly, in the ratio of the age. Thus according to the approximative table, constructed by Gaubius on the basis of experience, supposing the dose of a given medicine proper for a healthy adult to be one drachm,

that for a patient of	20	years old will be about	℈ij.	or two thirds,
—	14	—	—	ʒss.	— one half,
—	7	—	—	℈j.	— one third,
—	4	—	—	gr xv.	— one fourth,
—	3	—	—	gr x.	— one sixth,
—	2	—	—	gr viii.	— one eighth,
—	1	—	—	gr v.	— one twelfth;

or according to the formula of Dr. Young, which is more easily retained in the memory than the above table, and comes sufficiently close to it in its results for

all practical purposes, "the doses of most medicines for children under twelve years of age, must be diminished in the proportion of the age to the age increased by 12: thus, for example, at two years, $\frac{2}{2+12}=\frac{1}{7}$."

But to all such generalisations, it must be recollected there are some remarkable exceptions. Thus even very young children bear *purgatives*, and especially *calomel*, in larger proportioned doses than adults; but though the immediate irritation produced by them in infancy is less conspicuous than at a more advanced period of life, it would be a grievous error to suppose that their frequent administration, and particularly that of the latter, can fail of being highly injurious and debilitating in the long run at any age. Mercury, however, it must be admitted is attended with little comparative risk of producing salivation in very early life: some practitioners of extensive experience have even declared that they never met with such an occurrence within the third year; but we have reason to believe that the exemption is not absolute.

With regard to *narcotics* on the other hand, it would be in the highest degree imprudent to venture on giving them to infants in any thing like such proportional doses as the above table would indicate. Children in the early months have been poisoned by a single drop of laudanum. Still when the use of such a remedy is clearly indicated, it may be ventured on with safety in prudent hands, even from the very earliest periods. Thus a drop of the tincture may be made up into an ounce mixture, and a teaspoonful be given at a time, and its effects carefully watched for two or three hours before venturing on a repetition of the dose: after the third month, half a drop may generally be ventured on at each dose, and after the sixth month a whole drop. These proportions are obviously only approximative, and must be modified in relation to the strength of the infant and the nature and period of the disease under which it labours. Where incessant purging and vomiting, or extreme spasmodic pain are present, the risk of its injurious effects are, *cæteris paribus*, the least. Stimulants of all kinds should, as a general rule, be administered to children with a sparing hand: there are however cases of extreme exhaustion and collapse, when their seasonable employment effects wonders. Blisters should not be kept on very young children above two or three hours, as frequently from the neglect of this precaution ill-conditioned sores of a gangrenous tendency have resulted; nor is very large sanguineous depletion, though recourse to it may be clearly requisite, quite so well tolerated at this as at a later age, the growth of the body at this period making incessant demands on the activity of the circulatory system.

Sex. Women, as having a more delicate frame, and greater nervous susceptibility, require for the most part weaker doses than men.

Temperament has likewise a most material influence, in respect to the relative effects of medical agents. The phlegmatic, melancholic, and athletic, or those with a fully developed muscular system, generally require a larger quantity of a given medicine, than the nervous or sanguineo-nervous temperament, in order to produce an equal amount of operation. The phlegmatic and the nervous coincide, however, in respect to commonly bearing large depletion by the lancet badly. To persons of a strumous feeble habit, a long-continued depressing treatment is peculiarly inimical, great reduction of diet, large losses of blood, and the free exhibition of mercury being notoriously injurious to such individuals, and only to be ventured on in cases of great urgency, and when the risk from the disease fairly outweighs that from the proposed treatment. It is in such habits as those last named, that the tonic system effects its greatest triumphs when judiciously applied and followed up perseveringly.

Idiosyncrasy. Individual peculiarities in respect to susceptibility to external agencies, though it be generally altogether impossible to give any rational explanation of their source, or even, from any external signs, to anticipate their existence, should invariably be inquired after, and respected by the prescriber. Such are amongst the cases in which the regular attendant has a decided ad-

vantage over a stranger. "Cum par scientia est, utiliorem tamen medicum esse amicum quam extraneum."

Gaubius speaks of a patient of his who was affected by so simple a substance as the "lapilli cancrorum," (little different from common chalk,) with symptoms almost as virulent as arsenic could have produced. Cullen knew a person who would faint at the smell of mutton, and another in whom convulsions were brought on by eating a morsel of egg. Certain shell-fish produce an almost immediate eruption in some habits; nuts in others. The dangerous effects produced by some varieties of mushroom are well known; but even the edible species are very injurious to particular individuals. We have known such persons have an attack of cholera brought on by eating hashes, into the composition of which ketchup entered, and one instance of a whole family suffering simultaneously from a sudden cutaneous eruption, from the same cause. Even tea and coffee, which agree so well with most people, in some instances, from their peculiar action on the nervous system and on the circulation, resemble poisons; and honey, which so many use as a regular article of diet, produces in others, even in very small quantities, severe gastro-intestinal irritation. We know an individual who, as often as he eats a few strawberries (generally speaking, one of the wholesomest of fruits), is immediately affected with a sense of prickling over the tongue; if he persists, this nervous irritation extends to the face and even to the upper part of the chest; another very strong man, in whom the use of the simplest of our garden fruits is followed soon after by an eruption of nettle-rash. The irritation of a blister, or even of leeches, will give rise to extensive erysipelas, in some habits. The very smell of a purgative, says Gaubius, will affect the bowels of some, whilst others cannot be moved by any thing under a double dose. The difference in regard to pain or uneasiness produced by the same purgative in different individuals is also very remarkable; even the simplest, as senna or manna, cause intolerable griping in some people. The susceptibility to the influence of mercury likewise varies in a very remarkable degree. We have seen a person salivated severely by four or five grains of blue pill taken in divided doses, in the course of two or three days, along with other medicines of an aperient nature, but which had failed to operate on the bowels. The facility of salivation was, in this case, hereditary. Mercury, in any form, excites in some individuals, and more particularly in those in whom salivation is not easily produced, a frightful degree of erethism, with most alarming depression of the vital powers. We have seen a complete, but temporary loss of sight, accompanied by various evidences of undue determination of blood to the head, supervene upon the occurrence of a violent salivation induced by the application of camphorated mercurial ointment for a few days to an enlarged testis. The effects of opium are so very distressing to certain patients as almost to preclude its use in the treatment of their diseases. Excessive itching and an eruption terminating in desquammation have been noticed amongst its occasional annoyances. But the examples of this kind are quite endless. Suffice it to say, that there is scarcely any article of food or medicine, however simple, which has not been known to prove peculiarly disagreeable or repulsive to some individual or other. The prudent practitioner may often save much unnecessary annoyance to all parties by making himself acquainted with his patient's previous experience on this head.

An accurate investigation into our patients' *habits* in respect to regimen and medicine is also of the first importance. Those who have been long addicted to intemperance generally bear depletions ill. Even the sudden abstraction of his accustomed stimulants from the habitual drunkard, without giving him any appropriate medicinal substitute, is a frequent source of delirium tremens, and even of fatal exhaustion. The ill effects of such sudden and total change in the habits have also been manifested, in a minor degree, in the retardation of recoveries after accidents, or severe surgical operations. The instant withdrawal of opium from those who have long been in the habit of using it, or even the too rapid reduction of the dose, has appeared to us decidedly to

shorten existence in incurable chronic disease. Most medicines, and especially narcotics, have their operation diminished by habitual use, as is daily observable in those who have addicted themselves to tobacco or to opiates. Hence this class of substances must be gradually augmented in dose, or else one kind of narcotic must be frequently substituted for another, if we would keep up an average amount of effect. To the general law of habit diminishing the influence of medicinal agents there are, however, some exceptions. Thus, for example, the saline aperients when taken in a very dilute form, and in the peculiar combinations in which they are presented in some natural mineral waters, appear to increase in influence according as they are continued; of which we have had personal conviction in respect to the thermal saline waters of Carlsbad, and the bitter water of Pullna in Bohemia; and the same holds good, though in a minor degree, in respect to the waters of Harrowgate, Cheltenham, Leamington, &c. Once that their influence over the secretions of the mucous membrane is established the daily repetition of the same, or sometimes of even a smaller dose, will sustain a similar amount of operation during many weeks; and often even after their use has been discontinued, there remains the well-formed habit of regular evacuation. There are, again, certain medicines which have a tendency to accumulate in the system, and to which repeated use seems to have no tendency to reconcile it; such, for instance, as mercury, lead, arsenic, iodine, and digitalis.

The *period* and *intensity of the disease* we have to treat, and the *degree of strength* remaining to the patient, obviously form most important data in the regulation of the proper doses. The same medicine which in the commencement of an acute affection might have exercised a most beneficial influence over its progress, may, if administered after debility or a tendency to collapse have manifested themselves, prove quickly fatal: whereas it is exactly at this period that another class of medicines, those of a stimulant nature, may be given with a most liberal hand, it being understood that their use shall always be commenced experimentally, that is, in small and dilute quantities, the effects of which are to be carefully watched.

With regard to evacuants, the danger of their free use in the advanced period of many acute and chronic disorders is now pretty generally understood; but with respect to anodynes and narcotics, we are not quite sure that the risk of *large* doses at a similar stage of illness, and when weakness and exhaustion have fully set in, is so universally known as to allow us to omit cautioning our younger brethren on the subject, even in relation to such patients as have, when in a stronger condition, habituated themselves to the use of this class of substances.

The state of the stomach and intestines will necessarily influence us much, both in respect to the quantity as well as of the quantity of medicine to be employed. When these organs are in a state of irritation, the exhibition of such a dose, as will in all probability either be rejected or increase the existing excitement, is worse than trifling. In this condition of the digestive organs certain medicines seem altogether to lose their specific effects. Digitalis, for example, no longer displays its powers of reducing the circulation, nor of augmenting the urinary secretion. Bark ceases to control ague, mercury to restrain syphilitic action, &c. In such cases an appropriate preparatory treatment and the simultaneous exhibition of judiciously selected corrigents are peculiarly called for. Again, when the secretions of the chylopoietic viscera are disordered, the administration of tonics and alteratives will generally prove totally inefficient till these have been first set right.

The condition of the *circulatory system* is another element never to be neglected in the determination of doses. To exhibit a nauseous medicine in such quantity as might perchance induce violent vomiting or extreme depression, would expose the patient labouring under particular states of disease of the heart or great vessels, to the peril of instantaneous death. When the *air passages* and *lungs* are extensively inflamed, and on the eve of relieving them-

selves by a copious secretion, the injurious effects of opiates is notorious. The state of the *brain*, likewise, and even that of the *skin*, are not to be lost sight of. To exhibit an antimonial or any other violent emetic to an apoplectic sufferer, or large doses of bark, opium, or other heating or stimulating medicine to a patient in whom a hot and dry skin and constipated bowels coexisted with marked symptoms of morbid determination to the brain, might be to seal his fate. In mental derangement on the other hand, somewhat larger doses than ordinary of certain medicines, of the evacuant class especially, become necessary, and this is still more pointedly the case in respect to those who labour under cerebral oppression. The exhibition of stimulants will generally "cæteris paribus" prove more injurious to those already exposed to sources of sensorial excitement, as for instance to the student and the anxious and confined man of business, than to those of more active and out-of-door habits.

The recognition of certain morbid states of the *urinary organs* may also limit us in the use of particular remedies, such as cantharides in any of its forms, external or internal, turpentine in small doses, &c. Of the importance of a knowledge of the actual condition of the *uterine system* towards successful or even safe prescriptions for females, both the public and the profession are sufficiently aware. The propriety of abstaining during the menstrual period from all violent doses, especially those of a drastic and exciting nature, as well as from all abstraction of blood which is not imperatively called for by the urgency of severe disease, is very generally agreed upon. During pregnancy likewise the mildest medicines, and in moderate doses, are alone eligible, and the exhibition of mercury with a view to affect the system, of digitalis and of rough and depressing emetics and other medicines of great energy, should, unless under very pressing circumstances, be postponed.

The influence which *climate* and *season* should exercise in the modification of our doses is also generally acknowledged. Thus the large doses of calomel, which have been used with so much effect in controlling hepatic and other inflammations in warm countries, are rarely called for in this part of the world; whilst on the other hand, the profuse use of purgatives which is borne with *comparatively* little injury in our colder regions, would speedily exhaust the system, or produce acute inflammation, in the inhabitants of a warmer clime, and especially of such native races as are of a peculiarly slight form and impressionable habit, as, for example, the Hindoos, who are known to require much smaller doses of these and most other medicines than the Europeans who reside amongst them.

The *reigning diathesis* will also ever powerfully influence the prudent prescriber in the adaptation of his remedies. Thus where autumnal cholera or dysentery is prevalent, he will be moderate in the use of such medicines as tend to irritate the mucous membrane; when influenza or low fever reigns he will abstain from the very free use of lowering measures in slight ailments; so on the other hand, when an inflammatory or bilious tendency characterises the disorders of the season, he will display even in the earlier and less developed stages of a case a suitable activity in the use of their proper antagonists. The habitation of the patient, according as it is more or less healthy in point of locality and other circumstances which will readily suggest themselves, as well as the nature and abundance of the daily food, will also properly exercise a great influence over the details of treatment. No competent person would think of treating a pallid or emaciated manufacturer, the ill-fed inhabitant of a close and crowded lane in a city, with the same activity as a robust countryman, even supposing them both to be labouring under a similar inflammatory affection.

The *varying strength of medicines* is a source of considerable embarrassment in the regulation of the dose of some of the more powerful ones, and especially of those drawn from the vegetable kingdom. In the employment of the more energetic narcotics, their powdered leaves and extracts, it will be prudent, if the dose has already mounted up much above the initiatory quantity, on commencing a new parcel of the medicine, and especially if it be had from

a new source, to make a great reduction in the dose, and again cautiously to ascend. This is peculiarly requisite in regard to the vegetable alkaloids and prussic acid, as from the high price of the former there is too great temptation to adulterate them, and the latter, from its volatile quality, as well as from occasional carelessness in its preparation, has been known to present a most startling inequality of strength, one drop of some retailers being equal (as was found on a careful examination made some years ago) to three or even four drops of the preparation sold by another. Under such circumstances, it is not surely to be wondered at that serious accidents should have, from time to time, occurred: we believe, however, that since regular formulæ for making these substances have been introduced into our pharmacopœias, the danger from this very perplexing source has been in some degree diminished.

The *time of day* most appropriate for the exhibition of different medicines varies with the intention of the prescriber. Hypnotics should of course, in most instances, be given in preference towards night, as coinciding with the natural period of repose; so likewise emetics, that the exhaustion subsequent to their use may be effaced by the nightly rest to which they often dispose. Aperients of slow operation should likewise be given at the same period, or else very early in the morning, so that their action may fall in the day, and not interfere with the enjoyment of sleep, as this is so very important to all patients in febrile as well as in chronic affections. For a similar reason, and to facilitate the adaptation of a due temperature by the reduction of the coverings to a very moderate quantity, diuretics should be given at such time that their operation may also coincide with the day; whilst that of diaphoretics, on the other hand, is better directed on the night, when there is a natural tendency in the skin to relaxation; though doubtless there will occur very many cases where it will be proper to maintain their action both day and night, as is likewise so frequently the case with narcotics.

The *period allowed to elapse* between each dose of medicine, where it is necessary that it should be repeated, will vary with the object of its exhibition; thus, for example, emetics should be administered in small quantities at a time, every five or ten minutes, tepid diluents being freely interposed, till the stomach has fully discharged itself of its contents. Aperients generally act most mildly and effectually when given in small doses every three or four hours; so likewise in respect to diuretics and diaphoretics; whilst medicines calculated to induce sleep should, on the contrary, be administered in rather full doses, and at very distant intervals, as every twelve or twenty-four hours. For exemplifications of this and of most of the preceding remarks, as well as for several further necessary details, we must refer to the selection of prescriptions which follow.

EXTEMPORANEOUS FORMULÆ.

I. STIMULANTS.

Including aromatic and diffusible stimulants, carminatives, and stomachics, and also tonic stimulants, such as the mineral acids, irritants and counter-irritants, stimulant baths, &c.

By the term stimulant, or excitant, is meant a substance which speedily augments the action of the part to which it is immediately applied (generally a portion either of the mucous membrane or of the skin), and subsequently, after a very brief interval, that of the system at large through the medium of sympathy.

Medicines of this class, especially when introduced into the stomach, exalt at once the sensibility of the nervous system, and the action of the muscular fibre, as well as that of the mucous membrane. They augment the strength and frequency of the heart's pulsations, give vigour to the play of the lungs, and raise the temperature of the whole body. In some instances they prove excitant, and even irritant, to the urinary organs.

In their mode of action they approach most nearly to narcotics and to tonics. The former indeed, if regard be had only to their primary action, are not always satisfactorily distinguishable from stimulants. From tonics they differ, and especially the so-called diffusible stimulants, in the rapidity and comparatively evanescent nature of their action, in their power of increasing the susceptibility to external impressions, and the tendency they have to be followed by exhaustion when once their action is expended.

Their use is indicated chiefly in cases of temporary diminution of the nervous energy, and a feeble performance of the functions of various organs, as well as in pains of a nervous or spasmodic character. When they are intended to combat debility, as in the advanced periods of low fevers, their exhibition should at first be commenced experimentally, and their dose augmented in strength and frequency according to their observed effects, and especially according to their influence on the heart. When the pulse becomes slower and fuller under their use, the propriety of their continuance is clearly manifested, and particularly so if the sleep and powers of digestion are simultaneously improved. They should generally, on the other hand, be abstained from, or only very cautiously employed, where inflammation is present in an acute form in any part of the system. In chronic inflammation, however, their local application is occasionally beneficial, either in consequence of a diminished action of the capillaries succeeding secondarily to the excitement at first caused by their use, or else by means of a more healthy species of action being impressed on those vessels.

The great majority of vegetable substances exerting a stimulant power, are indebted for it to the presence of an essential oil. Camphor, ether, or ammonia, manifest the same quality in a very marked degree. Fermented liquors, too, from the alcohol which they contain, rank high in the class of excitants, both in respect to their beneficial results when judiciously exhibited, and their injurious consequences when unnecessarily or too freely employed.

Their habitual use, and more especially that of those of a very stomachic or spirituous character, ought, in almost all instances, to be discouraged, as from the agreeable but treacherous excitement, both mental and corporeal, which immediately follows their exhibition, as well as from the distressing feelings of collapse which ensue upon the termination of their action, forthwith suggesting instinctively the desire of a repetition of the dose in a still stronger form, a tendency to confirmed dram-drinking is too apt to be the result.

In the imponderable agents, light, heat, and electricity, and especially the two latter, we are possessed of very potent means of exciting the animal system. The commonest form of employing caloric with this view is that of the warm water, simple or medicated, vapour or air-bath, the temperature of

the first being generally from 97° to 100°; that of the two latter being commonly raised some 20° or 30° higher. Sometimes heat is applied in a still more concentrated form, when we would instantaneously rouse the sinking powers of life; and this is effected by applying momentarily to the epigastrium, or some other sensible part, a piece of metal, as the head of a hammer or bowl of a spoon, which has previously been held for some moments in boiling water, or close to, or even in the fire; or by inverting for an instant on the part we wish to stimulate, the mouth of a cup containing hot water, and having a piece of cloth braced tightly across it. Such applications are of course very painful, and apt to cause severe vesication; of counter-irritants of a somewhat milder character — liniments, stimulating baths, &c. — we shall subjoin several examples. Of moral stimulants, joy and hope are those of the greatest efficacy.

[The doses throughout are those suited for adults, where not otherwise expressed.]

℞ Spirit. Ammon. Arom. Spirit. Lavand. Comp. āā ℥j. M. Fiat Mistura. Sumat cochl. j. min. ex aquâ urgente flatu, aut languore.

℞ Aquæ Carui ℥j. Tinct. Cardam. Co. ʒj. Spirit. Ammon. Arom. ♏x. Syr. Croci ʒj. M. Fiat Haustus.

℞ Mist. Camph. ℥j. Spirit. Ammon. Arom. ♏xxx. Spirit. Lavand. Comp. Syr. Simp. āā ʒj. M. Fiat Haustus.

℞ Mist. Camph. ℥j. Spir. Æther. Sulph. ʒij. Tinct. Cardam. Comp. ʒiv. Spirit. Anisi ʒvj. Olei Carui ♏xii. Syr. Zing. ʒij. Aquæ Menthæ Pip. ℥vss. M. Fiat Mistura. Sumat cochl. ij. ampla urgente flatu (In flatulent Colic.)

℞ Magnesiæ ℈j. Ol. Carui. ♏iv. Spirit. Ammon. Fœtid. ♏xx. Tinct. Opii. ♏v. Syrup. Simp. ʒss. Aquæ Menth. Pip. ℥iss. M. Fiat Mistura. Capiat cochl. j. min. quartis horis. (In Diarrhœa and Flatulence in young children, continuing after the use of purgatives.)

℞ Aquæ Anethi ℥ij. Magnesiæ ʒss. Tinct. Opii ♏ii.—iv. Olei Anethi ♏ij. Sacch. Albi ℈ij. Confect. Arom. gr. x. M. Fiat Mistura. Capiat cochl. j. min. ter die. (In Colic of infants, accompanied by excessive vomiting and greenish unhealthy stools, a substitute for Dalby's Carminative.)

℞ Mist. Camph. ʒx. Spir. Æther. Sulph. ʒj. Confect. Aromat. ℈j. Spirit. Lavand. Comp. ʒss. M. Fiat Haustus, quartis horis repet. aut urgente paroxysmo. (In the sinking of Fever, attacks of Angina Pectoris, Palpitations, &c.)

℞ Magnes. Carb. ʒiss. Spirit. Æther. Sulph. Comp. ʒiij. Tinct. Cardam. Comp. ℥ss. Spirit. Anisi ʒv. Ol. Carui ♏viij. Syr. Zing. ʒij. Mist. Camph. ℥jss. Aquæ Menth. Vir. ℥v. M. Fiat Mistura. Sumat cochl. ij. ampla urgente, nauseâ vel flatu, prius agitatâ phialâ.

℞ Misturæ Camphoræ ℥vss. Ammon. Carbon. ʒss. Syr. Zing. ʒiv. M. Fiat Mistura. Capiat cochl. j. maximum secundis horis. (In the prostration of Typhoid Diseases.)

℞ Ammon. Carb. gr. x. Valer. Pulv. ℈j. Aquæ Cinnam. ℥ij. M. Fiat Haustus. (In Nervous Headach.)

℞ Ammon. Carb. gr. xv. Aquæ Distil. ℥j. Spirit. Myrist. ʒj. Syr. Aurant. ʒss. M. Fiat Haustus, c. succi Limonis cochl. j. magno inter effervescentiam sum.

℞ Confect. Arom. ʒss. Opii gr. ij. M. Divide in Pil. viij. Capiat unam tertiâ quâque horâ. (In small doses repeated at short intervals, Opium has a stimulant effect.)

℞ Sodæ Sesquicarb. gr. xx. Syr. Aurant. ʒj. Aquæ ℥jss. M. Fiat Haustus, cum ℥ss. succi Limonis sum. (To relieve Nausea and check excessive Vomiting.)

℞ Lactis Vacc. Oj. Sinap. Sem. Contus. ℥j. M. Coquantur simul donec coagulum formetur. Cola. Capiat seri cyathum subinde.

℞ Acid. Hydrochlorici ʒj. Aquæ Oj. Sacchari q. s. M. Fiat Mistura pro potu communi. (Stimulant and tonic in Typhoid Diseases.)

℞ Infus. Armor. Comp. ℥j. Spirit. Ammon. Arom. ʒss. Syr. Zing. ʒj. M. Fiat Haustus, sextis horis adhib.

℞ Creasoti ♏x. Pulv. Glycyr. ʒj. Muc. Acac. q. s. M. Divide in Pil. xx. Sumat duas ter die. (In Neuralgia, and Atonic Rheumatism, and Chronic Bronchitis; the number of Pills may be gradually increased to eight or ten at a time. Its effects are tonic and stimulant, and, in some instances, diuretic.)

℞ Creasoti ♏i. Mist. Camph. ℥j. Fiat Haustus. (To check Vomiting, when unconnected with inflammation or organic disease, in Sea-sickness, and to enable the stomach to bear nauseous medicines. When tolerated, the dose may be gradually increased to several drops, but always in a large proportion of Menstruum (at least half an ounce to each drop), on account of its acrid qualities.)

℞ Mist. Camph. ʒvj. Tinct. Guiac. Ammon. ʒij. Muc. Acac. Syrupi āā ʒj. M. Fiat Haustus; ter in die sum. (Chronic Rheumatism.)

℞ Decoct. Senegæ ℥ vjss. Muc. Acac. ʒ iv. Syr. Tolut. ℥ j. M. Fiat Mistura. Capiat cochl. iij. ampla tertiis horis. (In Catarrh attended with excessive secretion and debility.)

℞ Arnicæ Mont. Flor. ʒ j. Aquæ Ferv. O j. Stet per semihoram. Cola. Sumat cochl. ij.—iij. ampla ter die. (In Paralysis, Chronic Rheumatism, Dysentery. Its use requires caution.)

℞ Pulv. Flor. Arnicæ, Camphoræ āā gr. iv. Theriacæ q. s. Fiat Bolus.

℞ Aquæ Menth. Vir. ℥ vij. Confect. Rosæ Gall. ℥ j. Acid. Sulph. Dil. ʒ jss. M. Fiat Mistura. Sumat cochl. iij. ampla quartis horis ope tubuli vitrei.

℞ Acid. Nitric. Dil. ʒ jss.—ʒ ij. Aquæ ℥ xxiv. Sacchari ℥ jss. M. Fiat Mistura. Sumat ℥ iij. ter in die ope tubuli vitrei. (In Typhoid Fever, Chronic Hepatic Affections, and Secondary Syphilis.)

℞ Acid. Nitromuriat. ʒ ij. Aquæ ℥ xxiv. Sacchari ℥ jss. M. Fiat Mistura. Capiat ℥ iij. ter die ope tubuli vitrei. (In similar cases to the above, and in malignant Scarlet Fever.)

℞ Liquoris Calcis Chloridi (Ph. Lond.) ♏ xxx.—lx. Mist. Camph. ℥ ij. Syr. Aurant. ʒ ij. M. Fiat Haustus; quartis vel sextis horis repet. superbibendo aquæ Hordei cyathum. (Typhus Fever and Dysentery. The "Liquor Labarraquii Chloro-sodaicus" may be given in similar cases and doses.)

℞ Olei Tereb. Rect. ℥ j. Vitel. Ovi unius; tere simul et adde gradatim; Mist. Amyg. ℥ iv. Syr. Aurant. ℥ ij. Tinct. Lavand. Comp. ʒ iv. Ol. Cinnam. ♏ iv. Fiat Mistura. Sumat cochl. ij. ampla ter die. (In Iritis, Chronic Rheumatism, &c.)

℞ Olei Tereb. ʒ ij. Pulv. Caps. gr. x. Mellis ℥ iv. Pulv. Rad. Glycyr. q. s. M. Fiat Elect. Sumat cochl. j. magnum ter die, cum haustu cujusvis potus tenuis tepefacti. (Neuralgia, Sciatica, &c.)

℞ Copaibæ Bals. ʒ iij. Liq. Potassæ Carb. ʒ jss. Decoct. Hordei ℥ vijss. Copaibam cum liquore primum contere; dein adde gradatim Decoct. Hordei. Capiat ℥ j.—jss. ter die.

℞ Copaibæ Bals. Magnes. āā ℥ j. M. Divide in Pil. cc. Sumat vj.—xij. ter die.

℞ Piper. Cubebæ ℥ j. Sacch. Albi ʒ ij. Muc. Acac. ℥ ij. Aquæ Cinnam. ℥ vj. M. Fiat Emulsio. Capiat cochl. ij. magna ter in die. (Gonorrhœa, Gleet, &c.)

℞ Canthar. Pulv. gr. ij. Camphoræ gr. iv. Extr. Hyosc. gr. vj. Contere simul optimo. Divide in Pil. iv. Capiat unam bis in die superbibendo affatim Decoct. Hordei. (In obstinate Gleet, Incontinence of Urine from debility of the bladder. Its use requires great caution. The Tincture is a more manageable form.)

℞ Bals. Peruv. ʒ ij. Vitel. Ovor. ij. tere simul et adde Extr. Cinch. ʒ iv. Mell. Ros. ℥ vj. M. Capiat cochl. j. mag. ter die. (Chronic Bronchitis.)

℞ Tinct. Capsici ʒ iv.—viij. Aquæ Rosæ ℥ vij. Syr. Rosæ Gall. ℥ j. M. Fiat Gargarisma. Sæpius in die utend. (Cynanche Tonsillaris.)

℞ Capsici Pulv. ʒ ij. Sodii Chloridi ʒ j. Aquæ Bullientis ℥ vj. M. Stet per semihoram. Cola. Colaturæ adde Aceti ℥ vj. M. Fiat Gargarisma. (Cynanche Tonsillaris.)

℞ Potassæ Nitrat. ʒ ij. Decoct. Hordei ℥ vij. Mellis Rosæ ℥ j. M. Fiat Gargarisma. (Common Sore-throat.)

℞ Infus. Rosæ Comp. ℥ vjss. Acid. Sulph. Dil. ʒ ss.; Mellis Rosæ ℥ jss. M. Fiat Gargarisma.

℞ Liquor. Chloro-sodaici (Labarraquii) ℥ jss. Aquæ Distill. ℥ vj. Mellis ℥ ss. M. Fiat. Gargarisma. (Angina Gangrenosa.)

℞ Muc. Acac. ℥ viij. Ol. Tereb. ʒ ij. M. Fiat Gargarisma. (In Ptyalism.)

℞ Sodæ Sub-borat. ʒ ij. Mellis Rosæ ℥ ij. Tinct. Myrrhæ ʒ ij. Aquæ ℥ vj. M. Fiat Gargarisma.

℞ Acidi Hydrochlorici ʒ j.—ʒ jss. Syr. Rosæ Gall. ℥ j. Dec. Hordei ℥ vij. M. Fiat Gargarisma.

℞ Liq. Calcii Chloridi (Ph. Lond.) ʒ iv. Aquæ ℔ j. M. Fiat Gargarisma. (Cynanche. Serves also for a lotion to Burns, Gangrenous Sores, Scorbutic and Mercurial Ulceration of Gums, &c. and a somewhat stronger solution in Psora, Porrigo Favosa, Diphtherite, &c. viz. four parts water to one of the Liquor.)

℞ Decoct. Hordei ℥ xij. Liq. Calcii Chloridi (Ph. Lond.) ʒ iv. M. Fiat Enema, nocte maneque injic. (In Typhus, Dysentery, Cancer Uteri. A strong solution of the Chloride of Soda or of Lime is very useful as a disinfector, when sprinkled over the bed-clothes, floors, and excretions.)

℞ Aquæ Chlorinii (Saturatæ) ♏ v.—x. Aquæ Tepidæ ℥ iv. M. et statim inhaletur vapor. (Gangrene of the Lung, Phthisis. Stimulant and antiseptic. The inhalation may be continued for about five minutes, and repeated seven or eight times in the day.)

℞ Tinct. Iodinii ♏ x.—xx. Aquæ Tepid. ℥ iv. M. et statim inhaletur vapor. (Phthisis; requires much caution as well as the preceding. Their use should be immediately interrupted where undue irritation of the bronchial lining membrane is the result. The safest and most effectual method of inhaling Chlorine or Iodine is by allowing either of the above preparations to drop slowly by means of a cotton wick on water kept at the boiling point by a spirit lamp, so that the vapour shall be steadily diffused throughout the apartment for several hours at a time, and always in a dilute form, and accompanied by a sufficient supply of aqueous vapour, as in the ingenious apparatus described by Dr. Corrigan. N.B. For additional formulæ containing Iodine, see ALTERATIVES.)

℞ Olei Tereb. ℥ j. Aquæ Tepid. ℥ xij. Inhaletur vapor. (In Chronic Catarrh with profuse expectoration.)

℞ Sinapis Pulv. Micæ Panis āā ℥ iij. Aceti Tepid. q. s. M. Fiat Cataplasma. (Applied to the chest for a quarter of an hour at a time in incipient Catarrh; and to the feet as an excitant in the Collapse of Fever, &c. Should not be kept on long, else troublesome ulceration may ensue.)

℞ Sinapis Pulv. ℥ iv. Aquæ Tepidæ q. s. Fiat Pediluv. (In Congestions of Head or Chest, Amenorrhœa, &c.)

℞ Acid. Hydrochlor. ℥ ij.—iv. Aquæ Tepid. (96°) q. s. ut fiat Pediluv. (About four gallons.)

℞ Acidi Nitromuriat. ℥ ij.—iv. Aquæ Tepid. (96°) ℔ xxxij. M. Fiat Pediluvium. (In Dyspepsia with Hepatic Derangement and Constipation. It may also be used for sponging the abdomen and limbs. When applied as a bath to the whole body, the proportion of acid should be much smaller than this, or about one ounce to every eight gallons. The vessel employed should be of wood.)

℞ Potass. Carb. ℥ iv. Aquæ Tepid. ℔ ccc. M. Fiat Balneum Alkalinum. (Bran Decoction or Isinglass are occasionally added if the skin be very irritable.)

℞ Manganesii Binoxidi ℥ j. Sodii Chloridi (Salis Communis) ℥ iij. Tere optime simul. Adde Acidi Sulph. ℥ j. Aquæ ℥ ij. M. (The chlorine evolved from this mixture on the application of heat forms a powerful means of stimulating the surface in certain Cutaneous Affections and in Rheumatism, as well as of increasing the action of the liver in deranged states of that organ where Mercury might be unsuitable. The gas is received within an appropriate apparatus, so constructed, that while it acts on the skin it cannot reach the air-passages or eyes. It consists in a large wooden box to receive the body, with an aperture in the top through which the head passes. Round this aperture there is affixed a leathern cap furnished with a running string case, by means of which it can be drawn accurately around the top of the forehead and under the chin. The patient remains exposed to the action of the gas, at a temperature of about 112°, from fifteen minutes to half an hour every second day. A similar contrivance is applicable to sulphurous acid fumigations, the gas being evolved from sulphur in a state of combustion (a wick being passed down through it in a crucible). Aqueous vapour may, if requisite, be mingled with either of these gases by allowing water to drop slowly on a heated iron. Whichever of these gases is employed, it must be entirely withdrawn from the box, by means of a sufficient draught of atmospheric air at the end of the operation, and before the patient ventures to detach the head-piece, else injurious pulmonary irritation might ensue. The above mixture serves also for *fumigating* infected apartments, being placed in a china basin within a vessel of heated sand, the doors and windows being kept closed for an hour or upwards, and no one remaining in the place at the time, nor till after a free current of fresh air has been allowed to pass through it.)

℞ Acid. Acet. ℥ ss. Olei Tereb. ℥ jss. Vitellum Ovi j Ol. Limon. ʒ ss. Aquæ Rosæ ℥ ij. M. Fiat Liniment. (Applied with steady friction. A powerful counter-irritant, not suitable to irritable habits. The effect of Liniments depends very much on the degree of friction employed. There is good reason to believe that much of the occasional efficacy, as well as some of the dangerous results, of a nostrum of this kind of recent celebrity, were due to the quantum of friction with which it was applied, and the comparative sensibility of the patients' skins.)

℞ Ol. Croton. Tiglii ♏ x. Adipis ℥ ss. M. Fiat Unguentum. Infricetur ad nucis magnitudinem bis terve in die donec appareat eruptio cutanea. (A useful counter-irritant in internal inflammations after the acute stage is past, as in Laryngitis, &c.; also in Neuralgia.)

℞ Antim. Potassio-tartratis ℈ ij. Tinct. Canthar. ℥ j. Aquæ Rosæ ℥ ij. Solve Antimonii Pot-tartr. in Aqua Rosæ Calida; dein. adde Tincturam. Fiat Embrocatio. (To produce an artificial eruption if the common ointment of Tartrate of Antimony has failed.)

℞ Liq. Ammon. Fort. ℥ j. Spir. Rosmar. ʒ vj. Spirit. Camphoræ ʒ ij. M. Fiat Liquor contra-irritans. (This very potent counter-irritant, applicable both to Neuralgia and Inflammatory Affections, where a very rapid stimulation of the surface is proper, is applied by means of a compress moistened with it, and firmly pressed on the seat of the pain or over the trunk of the nerve leading to it: if on the face, the eyes should be carefully protected, by a thickly folded napkin, against the ammoniacal fumes. The application to be continued from a few seconds to six or eight minutes, according as we wish to produce a merely rubefacient effect or to vesicate. The only after dressing requisite, if any, is a light water dressing. This lotion is somewhat weaker than an analogous one employed by Dr. Granville. Its strength may be increased by diminishing the quantity of the second or third ingredient.)

℞ Linim. Sapon. C. ℥ jss. Liq. Ammon. Tinct. Canthar., Tinct. Opii āā ʒ j. M. Fiat Linimentum. (In Colic and other local pains.)

℞ Olei Succini ℥ j. Tinct. Opii ʒ iv. M. Fiat Linimentum. (In Neuralgia.)

℞ Linim. Ammon. ℥ jss. Ol. Tereb. ℥ ss. Ol. Cajeputi ʒ ij. M. Fiat Liniment. (A powerful counter-irritant in Chronic Rheumatism, Sciatica, &c.)

℞ Creasoti ♏ v.—xxx. Adipis ℥ ss. M. Fiat Unguentum. (Acne, Sycosis, Lepra, Psoriasis, Ozœna, and ill-conditioned Ulcers.)

℞ Creasoti ♏ iv.; Aquæ ℥ j. M. Fiat Embrocatio. (In facial Rheumatism. Its strength may be gradually increased. Creasote is also used for inhalation, a few drops in boiling water, in Chronic Bronchitis.)

℞ Potass. Sulphuret, Saponis Albi āā ʒ ij. Aquæ Calcis ℥ vij. Alcohol Rect. ʒ j. M. Fiat Lotio. (In Porrigo Favosa and Psora.)

℞ Potass. Carb. ℥ j. Sulphur. Precip. ℥ ij. Adipis ℥ iv. M. Fiat Unguentum. (In

Psora. Used in the Hôpital St. Louis. Cures within from 7 to 14 days, applied nightly.)

℞ Sulphuris ℥ v. Potass. Carb. ℥ ij. Aquæ ℥ j. Ol. Olivar. ℥ iv. Solve Potassam in Aquâ, dein. adde Sulphurem. (In Psora. Used in the Hôpital St. Louis.)

℞ Picis Liquidæ ℥ iv. Ceræ Flavæ ʒ iv. Solve leni calore, et ante frigefact. adde terendo Sulphuris ℥ j. M. Fiat Unguentum. (In Impetigo Favosa, Porrigo Scutulata, &c.)

℞ Sodæ Causticæ, Sulphureti Potass. ā ʒ iij. M. Fiat Unguentum. (In Tinea.)

℞ Potassæ Sulphureti ℥ iv. Aquæ Tepidæ (94°—96°) ℔ cc. M. Fiat Balneum. (A stimulant bath applicable to various Cutaneous Affections, Rheumatism, &c. When it was found too irritating, Dupuytren was in the habit of adding to it two pounds of white Flanders' glue dissolved in ten pints of boiling water. When on the other hand it is used for the cure of Itch, the quantity of the sulphuret may be increased fourfold.

A salt water bath may be formed by the addition of a quarter of a pound of common table salt to each gallon of water.)

℞ Hydrarg. Bichloridi gr. ss.—ij. Misturæ Amygdal Amar. ℥ vj. M. Fiat Lotio. (In Acne.)

℞ Hydrarg. ʒ ss. Acid. Nitric. ℥ j. Solve. Adde Aquæ Distil. ℔ ijss. M. Fiat Lotio. (In Psora and Prurigo about half an ounce of it is used night and morning It cures the Itch, on an average, in about three weeks, and is free from the disagreeable odour of sulphurous applications.)

℞ Argent. Nit. gr. j.—ij. Aquæ Distil. ℥ j. M. Fiat Collyrium. (In Catarrhal Ophthalmia. The bottle should be covered and kept in a dark place. A much stronger solution (gr. x. to ℥ j.) has been employed in Ophthalmia Monatorum, and a similar one has been used as an injection into the anterior part of the urethra in incipient Gonorrhœa (a dubious practice), and as a stimulant wash to gangrenous and other ulcerations, whose action it is desirable rapidly to change.)

℞ Argent. Nit. gr. x. Ung. Cetac. ʒ j. Liq. Plumbi Acet. ♏ x. Misce optime. Fiat Unguentum. (*Guthrie.*) (Purulent Ophthalmia. The size of a pin's head to be introduced between the eyelids.)

℞ Calomelanos gr. cc. Arsenici Oxid. Albi Pulv. gr. j. Misce optime. (In Lupus. To be thinly sprinkled over a small portion of diseased surface by means of a puff. Dupuytren found this almost specific.)

Stimulants acting principally on the Spinal Marrow and Motor Nerves.

℞ Strychn. Nucis Vomicæ Pulver. gr. iij. Pulv. Acac. ʒ j.; Aquæ Cinnam. ℥ jss. Tinct. Cardam. Comp. ʒ j. M. Fiat Haustus; ter die sum. (In cases of partial Paralysis depending on impairment of the functions of the spinal marrow and nerves of motion, as after slight injuries of the back, Colica Pictonum, &c. and unconnected with cerebral congestion, or with inflammatory or organic disease; the dose may be gradually increased up to x. or xij. grains, or till spasmodic contractions of the muscles have been produced. In moderate doses (iij. to v. grs.), it has been found useful in Dyspepsia unconnected with inflammation of the mucous membrane of the stomach; in Pyrosis and cases of mere functional disorder, indicated by slight pain, distension, and flatulence, after meals. (For its use in Dysentery and Diarrhœa, see ASTRINGENTS.) In excessive doses it produces alarming cerebral congestion, as manifested by stupor, vertigo, ringing in the ears, sleeplessness, and a flushed countenance. In cases of Paralysis, the powder is a less convenient and accurate form of administering the remedy than the extract and the alkaloid obtained from the nut.)

℞ Extract. Nucis Vomicæ ℈ j. Confect. Rosæ Gall. ʒ ij. Misce optime. Divide in Pil. lx. Sumat unam om. nocte maneque. (In Paralysis of the limbs, eyelids, sphincters of the bladder and rectum, &c. Amaurosis unaccompanied by congestive or inflammatory symptoms, &c. The dose may be gradually increased as far as two or three grains of the extract, or till its specific effect on the muscular system takes place. The bowels should be kept regular during its employment by occasional aperients.)

℞ Strychniæ gr. j. Conf. Rosæ. Gallicæ ℈ j. Misce optime. Divide in Pil. xij. æquales. Sumat unam nocte maneque. (In partial Paralysis. The dose may be cautiously increased to four or five of these pills at a time, or till Tremors and Tetanic Spasms of the muscles, or some of the other evidences of its influence mentioned above, begin to manifest themselves. In Amaurosis, Strychnia has also been employed endermically to the extent of the twelfth of a grain to a small blistered surface on the temple or brow, or in front of the ear.)

℞ Strychniæ gr. j. Sacchari Albi ʒ ij. Aquæ Distillatæ ℥ ij. Aceti ♏ ij. M. Fiat Mistura, cujus sumat. cochl. j.—ij. nocte maneque.

℞ Strychniæ gr. ij. Spirit. Rectificat. ℥ j. Solve. Hujus Tincturæ est Dosis ♏ x. ad xxx.

The following is a local Stimulant acting specially on the Uterus.

℞ Ergotæ (Secalis Cornuti) ʒ j. Aquæ ℥ iij. M. Decoque celeriter ad ℥ jss. Decocti è fæcibus effusi sumat partem tertiam ter in decursu horæ. (In lingering labours, when dependent merely on deficient action in the uterus. A tablespoonful to be taken every twenty minutes to the third time if necessary. The Ergot of Rye has been also used to check hæmorrhages from the uterus, bladder, and lungs, in doses of ten grains every second hour, to the third or fourth time, and in still smaller doses (v. gr. thrice a day), in Leucorrhœa.)

II. NARCOTICS.

Including Anodynes and Sedatives.

THE principal characteristic of this class consists in the power of lowering the energies of the system generally, and consequently diminishing the action of the several organs of the body, but more especially of the brain and nervous system. Immediately upon their exhibition, however, they commonly produce, though in very various degrees, a stimulant operation, of which when given in small quantities at a time, and frequently repeated, we may avail ourselves as a valuable means of excitement in some cases. Generally speaking however, and especially when they are given in full doses and at distant intervals, the excitement succeeding to the administration is so evanescent and so immediately followed by a state of collapse, as to be for the most part altogether overlooked. They are called *anodynes* in reference to their power of easing pain; *hypnotics* or *soporifics*, when given in full doses to enforce sleep; and *sedatives*, when exhibited with a view to diminish action, alleviate spasm, or control excessive secretions. Some individuals of the class, as prussic acid, tobacco, digitalis, and certain poisonous gases, as the sulphuretted and carburetted hydrogen, and carbonic acid, exercise on the system a much more marked and exclusively depressing or sedative influence than the rest. Though the action of the greater number of them is directed mainly upon the brain and nerves, a few, as tobacco and digitalis, seem to expend their force chiefly on the heart and circulation.

Opiates tend to diminish all the secretions, except perhaps that of the skin. The constipation to which they are thus apt to give rise should be combated by the simultaneous exhibition of mild aperients.—Some narcotics however, as hyoscyamus, are free from the inconvenience in question. In full doses they lower the temperature of the body, reduce the frequency and freedom of the inspirations, and so interfere with the adequate decarbonisation of the blood. When exhibited in acute inflammation after free venesection, in order to prevent the injurious reaction which is so apt to ensue thereon, the dose should be a large one, as fractional doses rather, as we have just seen, tend to excite than to reduce vascular action.

Narcotics, when continued for any length of time, must be given in progressively increasing quantities, as the system becomes by use less sensible to their influence. When applied externally, their effects, though less in degree, are similar in kind to those produced by their introduction into the stomach or intestines.

When taken in excessive doses they produce vertigo, impaired vision, stupor, and occasionally convulsions and fatal coma. The principal object to be effected in such cases is their instant evacuation, either by the stomach pump or emetics, whilst at the same time the action of the brain, heart, and lungs, is to be sustained by appropriate stimuli, external and internal, by forced muscular exertions, and if all other measures fail, by the employment of artificial respiration.

In the debilitated, and those unaccustomed to their use, the incipient doses should be very moderate, and even in changing from one species of narcotic to another, we must descend to a very low point in the scale. In cases where congestion of the brain is a prominent symptom, as well as in the advanced stages of disease of the heart, when they might too far depress its already deficient powers, their use requires great circumspection; so likewise in diseases of the lungs, when their ill-timed or excessive employment might, by at once interfering with expectoration and with freedom of inspiration, tend to augment pulmonary congestion, and to prevent the due action of the air on the blood.

℞ Opii gr. j. Fiat Pilula; horâ somni sum. (To procure sleep.)

℞ Opii Extr. Aquos. gr. j. Pil. Galbani Comp. gr. iv. M. Fiat Pil.; h. s. sum.

℞ Opii gr. j. Pil. Aloes cum Myrrhâ gr. vij. M. Divide in Pil. ij.; h. s. sum. (The aperient pill added to counteract the constipating effect of the Opium.)

℞ Extr. Opii Aquos. gr. j. Camphoræ gr. ij. Syrupi q. s. ut fiat Pil. j.; h. s. sum.

℞ Tinct. Opii ♏ xx. Aquæ Cinnam. ℥ jss. M. Fiat Haust.; h. s. sum.

℞ Aceti Opii (vel *Guttæ Nigræ*) ♏ x. Mistura Camphoræ ℥j. M. Fiat Haust.; h. s. sum. (This preparation has less tendency to confine the bowels, and disorder the head and stomach, than opium or its tincture.)

℞ Mist. Camphoræ ℥ j. Tinct. Opii ♏ xxx. Liq. Antim. Potassio-Tart. ♏ xxv. M. Fiat Haust.; h. s. sum.) Narcotic and diaphoretic.)

℞ Conf. Opii ℈ j. Aquæ Menthæ Pip. ℥ j. Syr. Zing. ʒ j. M. Fiat Haust. (Flatulent Colic, Atonic Gout.)

℞ Tinct. Opii ♏ xxv. Spir. Æther. Sulphur. ♏ xxx. Syr. Tolut. ʒ jss. Mist. Camphoræ ℥ j. M. Fiat Haust. Anodynus.

℞ Opii Pulv. gr. j. Potass. Nit. gr. xij. Sacch. Albi ℈ ij. M. Divide in Pulv. vj. Sumat j. secundâ q. q. horâ.

℞ Opii Pulv. gr. ij. Antimon. Potassio-Tart. gr. j. Theriacæ q. s. ut fiant Pil. iv. Sumat unam bis quotidie. (Rheumatism.)

℞ Opii gr. ij. Saponis Duri gr. iij. Fiat Suppositorium. M. (To procure sleep, and to allay pain in the bladder, rectum, or uterus.)

℞ Tinct. Opii ♏ xl. Mucilag. Amyli ℥ iv. M. Fiat Enema. (In Dysentery, &c.)

℞ Mist. Cretæ ℥ vj. Conf. Arom. ʒ ij. Tinct. Opii ♏ xxx. Aquæ Cinnam. ℥ ij. M. Fiat Mistura. Sumat cochl. ij. ampla post singulas sedes liquidas. (Chronic Diarrhœa.)

℞ Pulv. Cretæ Comp. cum Opio ℈ j. Syr. Simpl. ʒ j. Aquæ Cinnam. ʒ xj. M. Fiat Haust.; sextis horis repetendus. (In Chronic Dysentery and Diarrhœa.)

℞ Aquæ Distil. ℥ j. Muc. Acac., Syr. Simp. ā ℥ss. Tinct. Opii ♏ j. M. Fiat Mistura narcotica pro infantibus. (Of this narcotic mixture, an infant in the first month may take a tea-spoonful every half hour till sleep is induced; in the second month two tea-spoonfuls.)

℞ Pulv. Ipecac. Comp. gr j. Sacchari ℈ j. Misce optime. Divide in Pulv. iv. Sumat unum pro dosi. (Safe opiate for very young infants — as from one to four weeks old.)

℞ Morphiæ Acet. gr. xvj. Aquæ Distil. ʒ vij.; Acid. Acet. ♏ iv. Alcohol. ʒ j. M. Sumat ♏ vj. (ad xxiv. gradatim aucta si opus sit) ex aquæ pauxillo.

℞ Morphiæ Acet. gr. j. Aquæ Distil. ℥ j. Solve. Sumat cochl. j. min. horâ somni, vel, urgente dolore, sexta q. q. horâ. (To procure sleep and allay pain. Less stimulating and constipating than Opium or its tincture. The dose may be gradually and cautiously raised, as it loses its effect, to a grain and even more at a time; but it is prudent in the case of so energetic a medicine, to begin with an under-dose where the patient is unaccustomed to the use of opiates, or in a debilitated condition. The Hydrochlorate (Muriate) of Morphia has been thought by some to be preferable as a narcotic to the Acetate: either it or the Sulphate, in similar quantities, may be substituted for the Acetate when the latter begins to lose its influence; but on making such changes we should at first always descend to a lower dose. The pillular form is attended with more risk than the solution. In certain idiosyncrasies these and all other opiates produce an alarming degree of sinking; in such cases they should always be exhibited in combination with an aromatic tincture. The Salts of Morphia may also be employed endermically — from a quarter of a grain to one grain being sprinkled over a small blistered surface, once or twice in a day. Their use in this form also requires extreme caution, from the rapidity with which their narcotic effects ensue.)

℞ Acid. Hydrocyan. Dil. (vel Medicinalis) ♏ ij. Mist. Amyg. ℥ ij. M. Fiat Haustus. (In Irritability of Stomach (Nervous Vomiting and Pyrosis) and Palpitations dependent thereon, Angina Pectoris, Spasmodic and Phthisical Cough, &c. The dose, may if requisite, be gradually increased to five or six drops, and in the case of very delicate individuals, it may for precaution be taken in divided portions at the interval of a few minutes. Its use requires extreme caution. When given in a mixture, the bottle should be well shaken before each dose. We should continue to get it from the same source during its use; or else return to smaller doses, as its strength varies remarkably at different shops.)

℞ Aquæ Lauro Cerasi ♏ xv. Mist. Amyg. ℥ ij. M. Fiat Haustus. (In Dyspepsia, Nervous Cough, &c. Dose may be gradually increased to one drachm.)

℞ Extr. Conii ʒ ss. Pulv. Folior. Conii gr. xv. M. Divide in Pil. xv. Sumat unam ter die; gradatim augeatur dosis si opus sit. (In Cancer, and other painful affections of a chronic nature, especially when Opium disagrees, or produces troublesome constipation.)

℞ Extr. Conii ℈ j. Pulv. Ipecac. Comp. ʒ ss. M. Divide in Pil. x. Sumat unam tertiâ q. q. horâ. (In painful affections.)

℞ Extr. Conii gr. iij. Magnes. Sulph. ʒ ss. Aquæ Carui, ʒ v. Syr. Tolut. ʒ j. M. Fiat Haust.; ter in die sum.

℞ Extr. Hyosc. gr xij. Camphoræ gr. vj. Spir. Rectif. ♏ ij. Tere simul, et divide in Pil. vj. Sumat duas om. nocte.

℞ Extr. Hyosc. gr. iij. Extr. Conii gr. ij. M. Fiat Pil. j. Horâ somni sum.

℞ Extr. Hyosc. gr. iv. Calomelanos gr. j. M. Fiat Pil. j.; omni nocte sum.

℞ Extr. Conii ʒ j. Pulv. Digit., Calomelanos, āā gr. v. Tere optime simul, et divide in Pil. xv. æquales, quorum sumat unam ter die.

℞ Succi Spiss. Lactucæ Vir. ʒ ss. Pulv. Trag. Comp. ℈ j. Potass. Nitr. ℈ ij. Mist. Amyg. ℥ iv. M. Fiat Mistura, cujus sumat cochl. j. amplum ter die.

℞ Extr. Lactucæ Sativæ gr. iv. Camphoræ Rasæ gr. j. M. Fiat Pil. j.; h. s. sum. (A sedative, which does not, in moderate doses, produce the disagreeable narcotic effects of most of the class.)

℞ Stramonii Seminum ℥ ij. Vini Albi ℥ viij. Spir. Rectific. ℥ j. M. Macera per dies duas et cola. (The dose of this preparation, which was thought by Hufeland superior as an anodyne to Opium, is from vi. to xx. drops, in a glass of sugar and water.)

℞ Extr. Stramonii gr. j. Extr. Glycyr. gr. vij. M. optime. Divide in Pil. iv. Capiat unam nocte maneque. (In Asthma, and other Spasmodic Affections, the dose may be gradually raised to three grains and upwards.)

℞ Extr. Aconiti gr. j. Extr. Glycyr. gr. vij. M. optime. Divide in Pil. iv. Sumat unam nocte maneque. (In obstinate Chronic Rheumatism, Syphilitic Nodes, Scirrhus. The dose may be cautiously increased to half a grain at a time.)

℞ Pulv. Digit., Pulv. Scillæ ā gr. xij. Extr. Hyosc. gr. xviij. M. Divide in Pil. xij. Sumat j. ter die. (In Angina Pectoris, Asthma, and Chronic Bronchitis, complicated with diseased heart.)

℞ Tinct. Digit. ʒ jss. Tinct. Hyosc. ʒ j. Mist. Camph. ℥ iv. Fiat Mist. cujus sumat cochl. j. min. p. r. n. (Anodyne and sedative in palpitations connected with Hypertrophy, Angina Pectoris, &c.)

℞ Extr. Belladonnæ gr. iv. Succi Spiss. Sambuci Nigri ʒ ss. Divide in Pil. xvj. Sumat j. sextis horis. (In Hooping-cough and Scarlet Fever in Italy; but generally at shorter intervals, as two hours, between each dose: The dose is that for an adult, and may be gradually increased to 4 or 5 pills.)

℞ Extr. Belladonnæ gr. ij. Aquæ Distil. ℥ j. Fiat. Mistura. Sumat ♏ ij.—v. quotidie. (*Hahnemann.*) (Supposed prophylactic against Scarlet Fever. Children above six years may take double the above doses. A solution of about four times the above strength has also been used in Germany, in doses of from v. to x. drops to check Nervous Vomitings.)

℞ Opii ʒ ij. Aquæ Ferv. ℔ j. Solve pro fomentatione.

℞ Tinct. Opii ℥ j. Aquæ ℔ j. M. Fiat Lotio. (Anodyne and refrigerant.)

℞ Sodæ Carb. ʒ ij. Extr. Opii gr. x. Calcis ʒ j. Adipis ℥ ij. M. Fiat Unguentum. (Prurigo.)

℞ Lin. Camphoræ Comp. ℥ ij. Tinct. Opii ʒ ij. M. Fiat Embrocatio ad fricandam dorsi spinam, &c. (In Hooping-cough, also in Rheumatic and Neuralgic pains.)

℞ Opii et Camphoræ, āā ʒ ss. Empl. Plumbi q. s. M. Fiat Emplastrum pectori applicandum. (Angina Pectoris.)

℞ Conii Fol. Exsic. ℥ j. Aquæ ℔ ijss. Decoque ad ℔ ij. Cola. Sit pro fomentatione. (In Scrofulous Ulcerations, Cancer, &c.)

℞ Conii Fol. Exsic. ℥ ij. Med. Panis ℥ vj. Aquæ Fervent. ℔ j. Coque simul, ut fiat Cataplasma. (Cancer, &c.)

℞ Extr. Belladonnæ ʒ ij. Cerat. Cetac. ℥ j. M. Fiat Ung. (In Spasmodic Stricture of the Rectum, or Sphincter Ani, or Neck of the Bladder to be rubbed on the perineum; also in inflamed Piles, Scrofulous Swelling of the Joints, &c. and Dysentery.)

℞ Extr. Belladonnæ ℥ j. Lin. Saponis ℥ viij. M. Fiat Liniment. (Tic Douloureux, &c.)

℞ Fol. Belladonnæ gr. xij. Aquæ Fervent. ℥ vj. Macera. Fiat Enema. (In Spasmodic Contraction of the Urethra, preventing the introduction of catheter. The employment of this and all other forms of Belladonna require much caution; their effects should be closely watched.)

℞ Extr. Belladonnæ ʒ ij. Aquæ Cal. ℥ viij. Olei Amyg. ℥ iv. M. Fiat Lin. (In Acute Eczema and Impetigo: to be applied with a feather.)

℞ Extr. Belladonnæ ʒ j. Emp. Saponis ʒ ij. M. Fiat Emplastr.; regioni cordis applicand. (Angina Pectoris. It should be renewed weekly.)

℞ Tabaci Fol. ℥ ij. Aquæ Ferv. ℔ iv. M. Macera per semihoram. Sit pro fotu abdominis. (In Acute Dysentery, Lead Colic, &c. The fomentation to be continued till dizziness or nausea supervene.)

℞ Acidi Hydrocyanici Dil. ʒ j.—iv. Decocti Malvæ ℔ j. M. Fiat Lotio. (In irritable Cutaneous Affections, to correct itching (Acne and Impetigo); in Ulcerated Cancer, to diminish pain. The bottle should be well shaken before each application.)

℞ Veratriæ gr. iv. in Alcohol. ♏ vj. solutæ; Adipis ℥ ss. M. optime. Fiat Unguentum. (In very painful Chronic Rheumatism, Neuralgia, Angina Pectoris, Gouty and Rheumatic Paralysis, &c. about the size of a small nut, to be rubbed in night and morning. Its strength may be gradually increased to double the above. It causes heat and tingling in the part, sensations which sometimes extend after a few days over the whole body, accompanied occasionally by muscular twitchings of the mouth and eyelids. Though it modifies so remarkably the sensibility of the parts on which it is rubbed, it produces no external marks of irritation. It has sometimes caused Diuresis and Constipation; yet its internal use in the form of tincture and pill, in doses of from the sixteenth to the half of a grain, has been resorted to by Magendie with success in cases of obstinate Constipation in old persons, and as a substitute for the eau médicinale, a practice which however, from the virulent nature of the poison, we by no means recommend

for imitation. The author just named has used it also endermically to the amount of a grain, applied to a small blistered surface over the course of the nerve, in violent tic of the face, the application being renewed at a fresh point every fifth day. The experience of Dr. Copland and most others who have employed it recently in painful affections, by no means confirms the high eulogium passed on the ointment of Veratria some years ago; for, like other remedies, it very often disappoints us in these cases. Its exceeding high price also limits its use. See *Gully's Translation of Magendie's Formulæ*.)

℞ Aconitinæ gr. ij.—iv. Alcohol. ♏ vj. Adipis ℥ ss. M. optime. Fiat Ung. (In similar cases to the above, and like it, its effects must be carefully watched.)

℞ Liq. Potass. ʒ ij. Acid. Hydrocyan. Dil. ʒ j. Mist. Amyg. ℥ viij. M. Fiat Lotio. (In Prurigo; and also, omitting the Liq. Potass., in Eczema.)

℞ Mist. Amyg. ℥ vj. Hydr. Bichloridi gr. j. Fiat Lotio. (To check the itching of Lichen, a drachm of dilute Hydrocyanic Acid may occasionally be added with advantage.)

℞ Acid. Hydrocyan. ʒ ij.—iv. Aquæ Distil. ℥ viij. Alcohol. ʒ iv. Acet. Plumbi gr. xvj. M. Fiat Lotio. (In Impetigo with excessive itching.)

℞ Potassæ Cyanidi gr. xij. Mist. Amyg. ℥ vj. M. Fiat Lotio. (In Lichen and other Chronic Eruptions attended with much pruritus.)

℞ Potassæ Cyanidi gr. xij. Olei Amyg. ʒ ij. Ung. Ceræ Albæ ℥ ij. M. Fiat Ung. (In Lichen and Prurigo, when the skin is very dry, and the pruritus severe.)

℞ Cocculi Suberosi (Indici) ʒ j.—ij. Adipis ℥ j. M. Fiat Unguentum. (Porrigo Scutulata (Ringworm). Narcotic and stimulant. An Indian remedy, of some celebrity in the same affection, consists of an ounce of Galls along with the same quantity of Lard, and one scruple of Sulphate of Copper.

III. ANTISPASMODICS.

Of the substances which tend to put an end to irregular muscular contractions, some owe this power to their narcotic, and others to their tonic qualities; the former apparently obviating, by their sedative influence, the irritation on which spasmodic action is so often dependent; the latter counteracting debility, a condition in which this morbid phenomenon is likewise peculiarly apt to manifest itself. Another set appear to act mainly by their stimulant nature, enabling them to make so strong an impression on the nerves of the suffering organ, as is sufficient to counterbalance the diseased excitement in which the spasm originates. There are yet others, such as musk, castor, valerian, and assafœtida, which without being strikingly endued with any of the qualities just named, seem to exert a specific power of alleviating spasm. The change of action which they induce is not succeeded by any marked degree of collapse, as is the case with some of the other agents just now mentioned. Their influence however, being like that of narcotics, of a fleeting nature, they ought to be administered either immediately before an expected attack, or frequently repeated during its continuance. Narcotics themselves too, when given with the intention of counteracting spasmodic action, should be employed in full and reiterated doses. It is quite remarkable how freely opiates may be exhibited with impunity, and with the most beneficial results, in painful affections of this kind. When tonics, on the contrary, are resorted to with a view of obviating a spasmodic tendency, their use must long be persevered in, during the intervals of the attacks. In spasms of the stomach, especially when complicated with biliary derangement, a protracted course of calomel often succeeds in removing the morbid disposition after the failure of all the more ordinary remedies.

Amongst the diseases to which antispasmodics are chiefly applicable, may be enumerated nervous palpitations, asthma, and angina pectoris, hysteria, chorea, epilepsy, tetanus, and hydrophobia, spasm in the stomach, diaphragm, and bladder, cholera, and colic, &c.

℞ Mist. Assafœt. ℥ vss.; Tinct. Valer. Ammon. ʒ iv. M. Fiat Mistura. Sumat quartam partem quartâ q.q. horâ. (In Nervous and Spasmodic Affections, Hysteria, Asthma, &c.)

℞ Mist. Camphoræ ℥ v. Spirit. Ammon. Fœtid. ʒ v. Syr. Croci ʒ iij. M. Fiat Mist. Cochl. ij. ampla pro dosi.

℞ Mist. Camphoræ ʒ x. Tinct. Opii. ♏ xl.

Spir. Æther. Sulph. ʒj. Syr. Rhœados ʒj. Misce. Fiat Haustus. (In very painful Spasmodic Affections, in Cramp of Stomach, &c.)

℞ Camphoræ, Conf. Rosæ āā ℈ij. Divide in Bolos viij. Sumat j. quartis horis. (In Typhus, with muttering delirium and subsultus tendinum.)

℞ Camphoræ, Potassæ Nit. āā ℈j. Vitelli Ovi q. s. Tere simul; adde Aquæ Flor. Aurant. ℥iv. Tinct. Hyosc. et Tinct. Conii āā ʒj. Fiat Mistura. Sumat cochl. j. ampl. tertiis horis. (Chordee.)

℞ Pulv. Valer. Rad. ℈j. Pulv. Cinnam. Comp. gr. x. M. Fiat Pulv. quartis horis sum. (In Hysteria, Nervous Headach, &c.)

℞ Pulv. Ipecac. Rad. gr. iv. Sodæ Carb. Exsic. ℈ij. Pulv. Opii. gr. ij. M. Divide in Pulv. iv. Sumat unum sextis horis. (Spasmodic Asthma — Pertussis of adults.)

℞ Opii gr. j. Castorei gr. ix. Pulv. Digit. gr. ij. Pil. Scillæ Comp. gr. viij. Divide in Pil. iv. Sumat j. ter die. (Asthma.)

℞ Tinct. Assafœt. ʒij. Tinct. Castor., Tinct. Moschi ā ʒj. Tinct. Opii ♏xxx. Fiat Mist. Sumat ♏xxx. ex Aquæ Menth. Pip. ℥j. secundis horis. (Hysteria.)

℞ Tinct. Castor. ʒj. Æther. Sulph. ♏xx. Tinct. Opii ♏viij. Aquæ Cinnam. ℥jss. Fiat Haustus; ter quotidie sum.

℞ Assafœt. ʒj. Aq. Menth. Pip. ℥vss. Tere optime simul, et adde Tinct. Valer. Ammon. ʒij. Tinct. Castor. ʒiij. Æther. Sulph. ʒj. M. Fiat Mistura. Sumat cochl. j. amplum secundis horis. (In Hysterical Paroxysms.)

℞ Valer. Rad. Pulv. ℈j. Tinct. Valer. Ammon. Tinct. Castor, ā ʒj. Mist. Camph. ℥jss. M. Fiat Haustus; ter in die sum.

℞ Tinct. Opii ♏iij. Vini Ipecac. ʒv. Syr. Tolut. ʒiij. Sodæ Carb. ℈j. Aquæ Rosæ ℥j. M. Fiat Mistura. Sumat cochl. j. min. quartâ q. q. horâ. (To infants in Hooping-cough, &c.)

℞ Moschi ʒj. Oxid. Zinci ʒss. Extr. Valer. q. s. ut fiat Pil. xxx. Sumat tres ter quotidie. (Epilepsy, &c.)

℞ Moschi ℈j. Pulv. Acac. ʒss. Tere simul, et adde gradatim Aquæ Cinnam. ʒx. Æther Sulph. ʒss. M. Fiat Haustus. p. r. n. sum.

℞ Mist. Moschi ℥vj. Spir. Amm. Arom. ʒij. Tinct. Castor. ʒiv. Syr. Papav. ʒij. Fiat Mist., cujus capiat cochl. iij. ampla quartis horis. (In Hysteria and Convulsive Affections, after purgatives.)

℞ Moschi gr. x. Camphoræ gr. v. Pulv. Opii gr. ss. Cons. Rosæ q. s. ut fiat Bolus.

℞ Castorei ℈j. Ammon. Carb. gr. v. Syr. q. s. ut fiat Bolus. (Hysteria.)

℞ Bismuthi Tris-Nitrat. gr. iv. Magnes., Sacch. Purif. āā ℈ij. Divide in Chart. iv. Sumat unam tertiis horis. (Dyspepsia.)

℞ Bismuthi Tris-Nitrat. ʒij. Muc. Acac. q. s. ut fiat Pil. xxxvi. Sumat unam secundis horis. (Gastrodynia.)

℞ Bismuthi Tris-Nitrat. ʒj. Castorei ʒss. Pulv. Trag. Comp. ʒij. M. Divide in Pulv. xij. Sumat unum ter die. (In Neuralgic Pain of Stomach and Intestines, Pyrosis, Chronic Gastritis, Cramps, Diarrhœa and Vomiting of Spasmodic Cholera. For formulæ for the Nitrate of Silver, the Sulphate and Ammoniuret of Copper, and the Salts of Iron, see TONICS and ASTRINGENTS.)

℞ Tinct. Digit. ♏x. Tinct. Calumbæ ʒj. Mist. Camph. ℥j. M. Fiat Haustus; bis terve quotidie sum. (In Palpitations, with great nervous irritability.)

℞ Assafœt. ʒij. Decoct. Avenæ ℥x. M. Fiat Enema. (In Flatulent Colic. This and the following ones to be administered tepid. One or two drachms of the aromatic Spirit of Ammonia and half a drachm of Tincture of Opium may occasionally be added.)

℞ Castorei, Moschi āā ʒss. Pulv. Acac. ʒij. Tere simul, et adde gradatim Decoct. Hordei ℥viij. Tinct. Opii ♏x. M. Fiat Enema. (In Hysteria, Epilepsy, Typhus with subsultus.)

℞ Camph. ʒj. cum guttis quibusdam Spirit. Rectif. in Pulv. redactæ; Vitel. Ovi unius; Decoct. Hordei ℥xiv. M. Fiat Enema. (In the adynamic stage of Fever.)

℞ Olei Tereb. ℥j. Camph. Rosæ ℈j. Ol. Oliv. ℥jss. Vitell. Ovi j. Spirit. Ammon. Fœtid. ʒij. Decoct. Avenæ ℥ix. M. Fiat Enema. (Purgative and antispasmodic. In Flatulent Colic, Tympanites, &c.)

℞ Tabaci Fol. ℈j. Aquæ Ferv. ℥viij. Macera per horam et cola. Fiat Enema. (In Ileus, Strangulated Hernia, Tetanus, &c.)

℞ Fol. Belladonnæ Exsic. gr. xij. Aquæ Calidæ ℥vj. M. Macera et cola. Sit pro enemate. (In Spasm of the Rectum or Neck of the Bladder.)

℞ Lin. Camph. ℥ij. Extr. Opii. Aquos. ʒss. Tere simul. Fiat Embrocatio. (To be rubbed along the spine in Hooping-cough.)

℞ Lin. Camph. Comp. ℥jss. Tinct. Canthar. ℈iv. Tinct. Opii ʒiij. M. Fiat Embrocatio. (To be rubbed over the abdomen in Colic, Cramp of Stomach, &c.)

IV. TONICS.

Tonics are medicines which, when judiciously employed, have the power of invigorating the functions of the body generally. They may be considered somewhat in the light of stimulants, of a slow but comparatively very permanent operation. Their beneficial results are to be sought for rather in their action on the vital principle than in any immediate chemical or mechanical change effected in the solids or fluids. Their influence, in the usual mode of their exhibition, is exerted, in the first instance, on the stomach; and subsequently by sympathy, aided in some cases by absorption, on more distant organs. When given in states of debility unaccompanied by any marked inflammatory tendency which should counter-indicate their use, they often display, in a very remarkable degree, their power of strengthening the digestion and circulation, and adding tone to the enfeebled muscular system. When taken imprudently by the strong and healthy, or by those labouring under plethora, with alarming tendency to congestion of the brain and other internal organs, and even in cases where their use is injudiciously prolonged, however suitable it may at first have been, they are capable of inducing eventually debility of the digestive organs and other very disastrous consequences, of which numerous instances presented themselves at the time when the employment of the celebrated Portland powder in the treatment of gouty patients was in vogue.

Tonics are divisible, according to their source, into the vegetable and the mineral. Many of the most influential of the former are possessed of bitter and aromatic principles in various degrees; and it is such which exert the most beneficial effects on the stomach and digestive organs.

It is in convalescencies from fever and other acute disorders, and in intermittents, that the most beneficial effects of tonics are witnessed, provided the stomach and bowels be first ascertained to be free from inflammatory action. In nervous affections, as chorea, neuralgia, and a general morbid increase of nervous susceptibility, &c. they are often employed with great advantage, and especially quinine and those of the mineral kind. In inflammations of the chest, of an acute or subacute character, they are, on the contrary, decidedly injurious; and it is only in the more chronic stages of bronchitis, where the mucous secretion is in excess, that we can hope for any good from their use. In hectic they are occasionally resorted to as palliatives. In the advanced stages of rheumatism they are often a valuable resource. In the treatment of typhus fever, in its latter periods, they are important auxiliaries to stimulants; and those of a more exciting character, such as quinine, or some other preparation of bark with sulphuric acid, cascarilla, cusparia, or serpentaria, are here usually selected.

In all cases where the effects likely to arise from the use of tonics are dubious, and especially where they are about to be administered for the relief of indigestion accompanied by marked irritability of the stomach, or in the course of convalescencies where there exists even the slightest suspicion of lingering inflammation, or ulceration in the intestines, their use should be entered on, if at all, with the greatest caution, the mildest kinds, the aromatic and bitter, being first experimentally prescribed, and that in the most moderate doses, and an ascending gradation of strength being subsequently resorted to, if the health is found to improve under their employment. Where it is desirable that they should be absorbed, it is particularly requisite that they should not be given in such a manner as to produce either general or local excitement.

The most useful adjuncts during their exhibition will be found in a somewhat generous diet proportioned to the strength of the digestive organs, together with the cold bath, the enjoyment of pure cool air, regular exercise, assiduous friction of the surface of the body, change of scene, rational amusements, and the indulgence of hopeful feelings.

℞ Infus. Gentian. Comp. ℥iij. Aquæ Cinnam. ℥j. Carb. Sodæ ℈ij. Rhei Pulv. gr. viij. Spirit. Lavand. Comp. ʒij. M. Fiat Mistura, cujus sumat quartam partem mane et meridie. (In Dyspepsia with acidity.)

℞ Infus. Cascar., Infus. Rhei, ā ʒiij. Aquæ Cinnam. ʒiv. M. Fiat Haustus; bis in die sum.

℞ Pulv. Rhei ℈j. Pulv. Capsici. Extr. Anthem. āā gr. x. M. Divide in Pil. x. Sumatur una quotidie ante prandium.

℞ Pulv. Myrrhæ, Pulv. Rhei ā ℈ij. Aloes Spicat., Extr. Tarax. ā ʒss. Olei Anthem. ♏ x. M. Divide in Pil. xxx. Sumat duas om. nocte.

℞ Pulv. Rhei, Potass. Sesquicarb. ā ʒj. Pulv. Calumbæ ʒij. Pulv. Arom. ʒss. M. Sumat gr. xv. bis in die.

℞ Pulv. Rhei, Sodæ Carb. Exsic., Extr. Gentian. āā ʒj. Pulv. Zing. ℈j. M. Divide in Pil. xl. Sumat duas ter die.

℞ Infus. Gentian. Comp. Aq. Cinn. āā ℥ij. Sodæ Carb. ʒj.; Sodæ Potassio-Tart. ℥j. M. Fiat Mistura. Sumat cochl. ij. magna mane et meridie. (Tonic and aperient.)

℞ Infus. Gentian. Comp. ℥ij. Liq. Calcis ℥iijss. Liq. Potass. ʒj. Tinct. Aurant. ʒiij. M. Fiat Mistura, cujus sumat cochl. iij. magna bis terve in die. (In Acidity of Stomach.)

℞ Infus. Cascar. ℥vij. Tinct. Cascar., Tinct. Zing. ā ʒiv. M. Fiat Mistura stomachica, cujus sumat cochl. iij. ampla ter die. (Dyspepsia with loss of appetite.)

℞ Extr. Tarax. ʒss. Aquæ Menth. Sativ. ℥jss. M. Fiat Haustus; meridie et vespere sum.

℞ Infus. Cuspar. ℥j. Ammon. Carb. gr. v. Conf. Aromat. gr. x. Spirit. Armor. Comp. ʒj. M. Fiat Haustus; ter die sum.

℞ Ext. Tarax. gr. x. Infus. Calumbæ. ℥j. Sodæ Carb. gr. iv. Tinct. Cardam. Comp. ʒj. Aquæ Pimentæ ℥iij. M. Fiat Haust.; ter quotidie sum. (Dyspepsia, Chronic Hepatic Affections.)

℞ Extract. Gentianæ ʒij. Fellis Bovinæ ʒiij. Pulv. Rhei ʒij. Assafœtidæ ʒj. M. Divide in Pil cxx. Sumat duas vel tres ter die.

℞ Calumbæ Rad. Incis., Cascar. Cort. Cont. ā ʒj. Aquæ Ferv. ℥vj. Macera per horas duas et cola. Colaturæ adde Tinct. Calumbæ ʒiij. Spir. Ammon. Arom. ♏ xxx. Spir. Aurant. ʒij. M. Sumat cochl. j. magnum ter die. (A light tonic in convalescencies, after Fever, Dysentery, &c.)

℞ Infus. Cinch., Infus. Rosæ Comp. āā ℥iv. M. Fiat Mistura. Sumat cochl. iij. ampla ter indies. (In convalescencies.)

℞ Pulv. Cinch. ʒij. Pulv. Valer. ʒj. M Divide in Chart. xij. Sumat unam bi. quotidie. (Neuralgia, Hysteria, Hemis crania.)

℞ Decocti Cinch. ℥vij. Confect. Arom. ʒjss. Tinct. Cinch. Comp. ℥j. M. Fiat Mist. Capiat cochl. iij. ampla quartis horis.

℞ Decoct. Cinch. ℥vjss. Acid. Sulph. Dil. ʒj. Tinct. Cardam. Comp., Syr. Aurant. ā ʒvj. M. Fiat Mistura. Capiat cochl. ij. majora ter quotidie.

℞ Decoct. Cinch. ℥jss. Extr. Cinch. gr. xv. Tinct. Cinch. ʒj. Spir. Ammon. Arom. ♏ xxx. M. Fiat Haustus; quartis horis sum.

℞ Cinch. Lancifol. Cont. ℥ss. Decoque ex aquæ puræ ℥xvj. ad consumpt. dimid., adjectis sub finem Coctionis Serpent. Rad. Cont. ʒij. Cola frigid. et Colaturæ adde Spir. Cinnam. Comp. ℥jss. Acid. Sulph. Dil. ʒjss. M. Fiat Mist. Sumat cochl. iv. ampla sextis horis. (*Pringle.*)

℞ Pulv. Cinch. ʒss.—ʒj. Pulv. Arom. gr. viij. M. Fiat Pulvis; quartis horis repet. ad quartam vicem. (In Ague, in the intervals.)

℞ Cinch. Cordifol. ℥j. Antim. Potassio-Tart. gr. j. Opii Pulv. gr. j. M. Divide in partes iv. Detur una secundâ q.q. horâ. (Malignant Intermittents of Italy.)

℞ Quinæ Disulph. gr. iij. Sacch. Albi gr. vij. M. Fiat Pulvis; tertiis horis sum. absente paroxysmo. (Ague.)

℞ Quinæ Disulph. ℈j. Extr. Cinch. gr. xv. M. Divide in Pil. x. Sumat j. tertiis horis.

℞ Quinæ Disulph. gr. ij. Infus. Rosæ Comp. ʒx. Syr. Aurant. ʒij. M. Fiat Haustus; quartâ quâque horâ sum.

℞ Quinæ Disulph. gr. ij. Acid. Sulph. Arom. ♏ xvj. Aquæ Distil. ℥jss. Syr. Caryophyll. ℥ss. M. Sumat ʒj.—ʒij. ter indies. (Tonic for very young infants.)

℞ Quinæ Disulph. gr. xviij. Acid. Sulph. Arom. ♏ lx. Infus. Aurant. Comp. ℥vj. Tinct. Cinch. Comp., Syr. Zing. āā ʒj. M. Fiat Mistura. Capiat cochl. ij ampla tertiis horis.

℞ Decoct. Cinch. ℥vjss. Acidi Hydrochlor. ʒjss. Mellis ℥jss. M. Fiat Gargarisma. (In Cynanche Maligna.)

℞ Cinch. Pulv. ℥j. Anthemid. Flor. ʒij. Aquæ Oj. decoque ad ℥x. Cola et adde Vini Rubri ℥ij. M. Fiat Enema.

℞ Quinæ Disulph. gr. xij. Acid. Sulph. Dil. ♏ vj. Tinct. Opii ♏ vj. Aquæ Tepidæ ℥vj. M. Fiat Enema. (Where the state of the stomach does not admit of the exhibition of Quinæ Sulph. in the ordinary way. It may also be employed in the endermic method; two or three grains, mixed with a little starch being applied fresh every fourth or fifth hour to a blistered surface in the epigastric region,—or five or six grains with lard in the form of an ointment. When the Sulphate of Quinine has been applied alone and unmixed, it has been known to produce troublesome ulcerations.)

℞ Ferri Sulph. ʒss. Sacchari Albi ʒjss. M. Divide in chart. xij. Signatur No 1.

℞ Sodæ Carb. ʒss. Sacchari Albi ʒjss. M.

Divide in chartulas xij. Signetur No. 2. (One of each of these powders is to be separately dissolved in half a glass of water, the solutions to be then mixed and drank off immediately. A substitute for natural chalybeate waters.

℞ Ferri Sesquioxid., Pulv Calumbæ āā gr. v. M. Fiat. Pulv. bis in die sum.

℞ Ferri Sesquioxid., Pulv. Rhei āā ʒj. Pulv. Calumbæ ℈iv. Zing. Pulv. ℈ij. M. Divide in Pulv. xij. Sumat unum ter in die. (In Tic-douloureux, Chlorosis, &c.)

℞ Ferri Sesquioxid. ʒiij. Pulv. Cinnam. Comp. ʒj. Syr. Aurant. ℥j. M. Fiat Elect. Sumat cochl. j. min. ter in die.

℞ Ferri Sesquioxid. gr. x. Pulv. Valer. ʒss. Syr. Zing. q.s. ut fiat Bolus ter quotidie sum.

℞ Ferri Sesquioxid. ʒjss. Pulv. Rhei gr. xv. Olei Anthem. ♏v. Extr. Gent. q. s. ut fiant Pilul. xx. Capiat tres mane et meridie super bibendo ♏xv. Acid. Sulph. Arom. e cyatho aquæ.

℞ Ferri Sesquioxid. gr. xij. Extr. Cinch. ℈j. Syr. Zing. q. s. ut fiant Pil. xij. Sumat duas ter quaterve in die. (Dyspepsia.)

℞ Pulv. Cort. Cinch. ℥j. Ferri Sesquioxid. ʒj. Syr. Zing. q. s. ut fiat Electuarium. Sumat cochl. j. min. ter quotidie.

℞ Ferri Potassio-Tart. ℈ij. Syr. Tolut. q. s. Divide in Bolos vj. Sumat unum ter die. (In Scrofulous Affections, Rickets, debility of the digestive organs, &c. From its taste not being disagreeable children take it readily. A nutritive diet should be conjoined, and the secretions of the intestinal mucous membrane promoted and corrected, if necessary, by Rhubarb, Ipecacuanha, Hydrarg. cum Cretâ, &c.)

℞ Ferri Potassio-Tart. gr. x. Pulv. Calumb. gr. xij. Pulv. Arom. gr. iv. M. Fiat Pulv. ter quotidie sum endus.

℞ Ferri Ammon. Chlor. ʒj. Extr. Aloes, Extr. Gent. āā ʒss. Contunde simul. Divide in Pil. xxx. Sumat duas ter quotidie. (Tonic and aperient. In Anæmia, Chlorosis, Scrofula, &c.)

℞ Ferri, Sulph. ʒj. Potass. Carb. gr. vj. Myrrhæ ʒj. Pulv. Aloes Comp. ʒss. Contunde simul; et divide in Pil. xxx. Sumat tres bis quotidie. (Tonic and aperient. In Chlorotic Amenorrhœa.)

℞ Infus. Quassiæ ℥jss. Tinct. Calumb. ʒj. Tinct. Ferri Muriat. ♏x. M. Fiat Haustus ter indies sumendus.

℞ Solutionis Magnesiæ (ope Acidi Carbonici) ℥jss. Tinct. Ferri Mur. ♏x. — xxx. Fiat Haust. ter in die sum. superbibendo aquæ vel frigidæ vel tepidæ cyathum. (*Murray*.) (A very efficient preparation. In Anæmia, Chlorosis, Nervous Palpitations, &c.)

℞ Ferri Sulph. Pulv. Subtiliss. ℥ss. Magnesiæ Calcin. ℈ij. Aquæ ℥vj. Tinct. Quassiæ, ʒij. Magnesiam cum pauxillo aquæ tere, et permistis quod reliquum est adde. Postea adjice Sulphas et Tincturam. Iterum paulisper tere, et *quam primum* in phialas sex divide, probe et protinus obturandas et cerâ obducendas. Sumatur j. nocte maneque. (In this formula of Mr. Donovan, the Protoxide is presented in its most soluble and energetic state. Each draught contains about 10 grains of Protoxide, and nearly 29 grains of Sulphate of Magnesia. For delicate stomachs half the above dose will be preferable. It should be prepared fresh every second or third day. The *pilules ferrugineuses* of Vallet are considered by the able chemist to whom we are indebted for the above preparation, to be the next best formula, and superior to the *ferruginous sugar* of Becker and Klauer, in which the Protoxide forms a compound of little solubility. *Griffiths's Mixture* and the *Pil. Ferri Comp.* (*Ph. Dub.*), though admitted to be very scientific preparations, are thought by Mr. Donovan to contain too little iron to be effectual. The tonic effects of chalybeates appear, however, in a great proportion of cases to be most satisfactory and permanent where administered in moderate quantities, as well as in a very soluble and dilute form, and where their use is long persevered in, as in the case of ferruginous mineral waters.)

℞ Ferri Cyanidi (Ferri Prussiat.) gr. iij. Syr. Simpl. ℥j. M. Fiat Haust. ter die sum. (In Chorea and Epilepsy; also in Intermittents and Scrofula. The dose may be gradually increased to six grains. Used in the hospitals of America.)

℞ Argenti Nit. gr. ij. (in Aquæ ♏ij. solut.) Micæ Panis ʒj. M. optime. Divide in Pil. xvj. Sumat unam ter die. (The bread should be well washed to remove all its free Muriate of Soda, and the Nitrate of Silver rubbed down quickly with a drop or two of distilled water in a glass mortar. The dose may be gradually increased to three or four pills or even a greater number, but its use should be frequently intermitted to avoid gastric irritation and permanent discolouration of the skin. Its use requires great caution. In Epilepsy, Angina Pectoris, palpitations connected with Dyspepsia, Gastrodynia, and other Neuralgia.)

℞ Argenti Nit. gr. ij. Ex. Humuli ℈j. Extr. Hyosc. gr. xij. Tere optime simul. Divide in Pil. octo. Sumat unam ter die. (In dyspeptic palpitation, Pyrosis, obstinate Leucorrhœa. The dose may be cautiously increased to two or even three pills, but only continued for a few days at a time. In the case of Pyrosis its influence is augmented by the addition of one eighth of a grain of Opium to each pill. Nitrate of Silver has also been used with good effect in the form of injection in Dysentery, four grains to six ounces of water.)

℞ Cupri Ammon. Sulph. gr. xij. Extr. Gent., Pulv. Calumb. āā ʒss. M. optime. Divide in Pil. xxxvj. Sumat unam bis quotidie. (Epilepsy, Chorea, &c. after a course of purgatives. The dose may be very cautiously increased to five or six pills at a time and upwards.)

℞ Cupri Sulph. gr. j. Syr. Papav. ℥j. Aquæ Anisi ℥iij. M. Fiat Mistura cujus sumat cochl. j. minimum quartis horis. (In Hooping-cough. The dose for children above seven years old may be double the above.)

℞ Cupri Sulph. gr. v. Pulv. Rhei ʒ ss. Extr. Gent. ʒ j. Syr. q. s. M. optime. Divide in Pil. xx. Sumat j.—ij. bis quotidie. (Leucorrhœa, Chorea, &c.)

℞ Liq. Arsenic. ♏ iv. Decoct. Cinch. ℥ x. Syr. Aurant. ʒ ij. Tinct Opii ♏ v. M. Fiat Haustus bis in die post cibum sumendus. (In obstinate Agues, inveterate Neuralgic Affections, periodic Headachs, Chronic Rheumatism, and some intractable cutaneous diseases. Its employment requires extreme circumspection, and should never be had recourse to till all milder remedies have failed. The Liquor Arsenicalis has, in some instances, been administered in gradually increased doses to the extent of fifteen or even twenty drops, but it is rarely requisite or even safe to go beyond half the latter quantity. Its use should be immediately suspended as soon as there is the slightest sign of irritation of the stomach, as increased thirst, nausea, anorexia, &c., or acceleration of the pulse, or a prickling sensation and stiffness in the eyelids. It should always be given after a light meal, so as in some degree to protect the mucous membrane.)

℞ Arsen. Protox. gr. j. Piper. Nigri gr. xij. Pulv. Acaciæ gr. ij. Aquæ Distil. q. s. M. optime, et fiat Massa in Pil. xvj. divid. (The celebrated Asiatic pill. The Arsenic ought to be very finely powdered and beaten for several hours in an iron mortar along with the Pepper, the gum and water afterwards added. One pill to be taken daily in Lepra Vulgaris, Lepra Tuberculosa, Lupus, Psoriasis, &c. The dose may sometimes be increased to two pills daily. For the *mineral acids*, see STIMULANTS.)

V. ASTRINGENTS.

ASTRINGENTS are defined, by Cullen, to be " such substances as, when applied to the human body, produce contraction and condensation of the soft solids, and thereby increase their density and cohesion ;" their effects being supposed to take place either immediately by contact, as in the case of their direct application to a part, or of their being subsequently carried to it through the medium of absorption and the circulation ; or else, secondarily, through the intervention of sympathy. But there is every reason to believe that this view of their operation is too limited, and that they exert a powerful influence immediately over the vitality as well as over the chemical and mechanical condition of parts.

The astringent and the tonic principles frequently co-exist in the same substance, in various degrees of respective predominance; the presence of the former often limiting the applications of the latter, and rendering the drug which contains both unsuitable to cases of great irritability of fibre.

Astringents of the vegetable class owe their corrugating influence, for the most part, to the presence of tannin, an element which seems sometimes to display a considerable power in controlling intermittent fever, and often enhances the febrifuge virtue of such tonics as it is naturally combined with.

Of the astringents drawn from the mineral kingdom the most frequently used are the sulphuric acid in a dilute state, alum and lime-water, the salts of iron, zinc, copper, silver, and lead.

This class of medicines manifest a remarkable power of restraining excessive evacuations and hæmorrhages of a passive character. Thus they are often very useful in leucorrhœa, in the latter stages of gonorrhœa and ophthalmia, of pulmonary and vesical catarrh, diarrhœa, and dysentery, after the inflammatory symptoms have been reduced by time or suitable treatment, and also in some cases of hæmoptysis, hæmatemesis, melæna, and hæmaturia, as well as of hæmorrhoids when in an indolent state. They are often useful in diabetes, and in cases of inordinate sweating, accompanied by great debility, and in the latter case especially so, if their effects be aided by a moderately cool atmosphere, and by the direction of the fluids internally by the judicious exhibition of aperients and other gentle evacuants tending to substitute a vicarious discharge.

In chronic hoarseness and relaxed sore throat, astringent applications are of decided utility, so likewise in calculous affections and chronic irritation of the urinary organs, in which a great portion of the benefit is probably ascribable to their action on the digestive system. Their use in flabby ulcers and various other morbid conditions of the surface of the body falling under the care of the surgeon, is well established.

In the earlier or more acute stages of inflammation, when the morbid action is already fully established, a recourse to astringent medicines commonly proves decidedly injurious; though there are certainly some exceptional cases, as for instance the ophthalmia neonatarum, connected with the irritation of gonorrhœal matter, in which applications of a very powerful astringent and stimulant nature (as the solution of the nitrate of silver containing from ten to twenty grains to the ounce of distilled water), when resorted to in the very commencement of the disorder, prove most beneficial; so also the use of a similar injection in the earliest period of specific urethral inflammation, care being taken, by pressing upon the passage, that it shall not pass backwards above a couple of inches.

The dangerous consequences of the employment of astringents in the case of critical discharges, or of such as are connected with a gorged state of the bloodvessels, or with some unremoved cause of local irritation, as, for example, irritating matters in the bowels, are indubitable.

The well-known power of opium in controlling the secretions and excretions, by diminishing the activity of nearly all the functions of the body, renders it a valuable auxiliary to astringents in many cases of profuse discharges, as likewise in many species of hæmorrhage, especially when preceded or accompanied by such remedies as tend to depress the circulation, as venesection, aperients, nauseants, digitalis, and the judicious employment of cold, both externally and internally.

Of the metallic astringents two of the most energetic, and which have of late years been considerably employed, are the diacetate of lead and the sulphate of copper. The former is one of the most powerful agents we possess for controlling internal hæmorrhages; and any injurious consequences which might otherwise arise from its use may generally be obviated by its combination with opium; and the free use of drinks acidulated with vinegar, to prevent the risk of the formation of the poisonous carbonate, is said to promote still further the safety of its exhibition. In the treatment of Asiatic cholera it has been strongly recommended upon high authority. In cases of obstinate diarrhœa and dysentery the sulphate of copper, united with opium, has been found in judicious hands a safe and very effectual remedy.

℞ Pulv. Alum. gr. x. Pulv. Kino gr. v. Confect. Rosæ ʒ j. M. Fiat Bolus, sextis horis sum. (In internal passive Hæmorrhages, Diabetes, Leucorrhœa, and Chronic Diarrhœa.)

℞ Lactis Vaccinæ Bullientis ℔ j. Alum. Contr. ʒ ij. Ebulliant simul et fiat coagulum. Coletur serum, cujus sumat cyathum subinde.

℞ Infus. Rosæ Comp. ℥ jss. Acid. Sulph. Dil. ♏ xv. Syr. ʒ j. M. Fiat Haustus quartis horis repetendus. (Internal Hæmorrhages.)

℞ Infus. Cascar. ℥ vj. Pulv. Kino Comp. ʒ j. Syr. Papav. ʒ iv. Fiat Mist., cujus sumat cochl. ij. ampla sextis horis. (Chronic Diarrhœa.)

℞ Infus. Cuspar. ℥ j. Tinct. Catechu ʒ j. Pulv. Ipecac. gr. x. M. Fiat. Haust. (In internal Hæmorrhages. Ipecacuanha, in scruple doses at distant intervals, or three or four grains every second hour, has been found very effectual in checking Hæmorrhage from the stomach or bowels as well as from the uterus and lungs.)

℞ Pulv. Ipecac. ʒ j. Aquæ ℥ xij. Decoque ad ℥ vj. Sumat cochl. iv. ampla sextis horis. (Chronic Dysentery.)

℞ Pulv. Ipecac. gr. jss. Alum. gr. vj. Syr. Papav. q. s. Fiat Bolus quartis vel sextis horis repet. (Chronic Dysentery.)

℞ Pulv. Rhei ʒ ss. Pulv. Opii gr. ij. Pulv. Aromatici gr. xij. M. Divide in Pulv. vj. Sumat unum quartis horis. (In Mercurial Dysentery, &c.)

℞ Mist. Cretæ ℥ jss. Tinct. Opii ♏ x. Tinct. Catechu ʒ j. M. Fiat Haustus tertiis horis, vel post singulas sedes liquidas sum. (Diarrhœa. See also Narcotics.)

℞ Pulv. Ipecac. Comp. gr. xij. Pulv. Arom. gr. viij. M. Divide in Pulv. iv. Sumat unum tertiâ q. q. horâ. (Diarrhœa and Dysentery.)

℞ Catechu Extr. Pulv. gr. xv. Pulv. Cretæ Comp. cum Opio ℈ j. M. Fiat Pulvis, quartis horis sum. (In Diarrhœa unaccompanied by inflammatory symptoms.)

℞. Extr. Hæmatox. gr. xv. Tinct. Krameriæ Rhataniæ ʒ j. Aquæ Cinnam. ʒ xv. M. Fiat Haustus quartâ q. q. horâ sum. (In the latter stages of Diarrhœa and Dysentery.)

℞ Krameriæ Rhataniæ Rad. ℥ ss. Aquæ ℔ ij. Decoque ad ℔ jss. Cola. Sumat cochl. tria ampla tertiâ q. q. horâ.

℞ Extr. Krameriæ ʒ j. Aquæ Rosæ ℥ iv. Syr. Papav. ℥ j. Fiat Mist. Sumat cochl. j. magnum secundâ q. q. horâ.

℞ Granati Baccæ Cort. ℥ ss. Lactis Vaccini Recentissimi ℔ iv. M. Decoque ad ℔ ij. Sumat cochl. iij. ampla tertiis horis. (Chronic Diarrhœa. A Spanish remedy of great efficacy, especially in cases when ordinary astringents are too irritating. When milk disagrees, it may be made with water and sweetened with Liquorice-root. It may also be used as an enema.)

℞ Pulv. Nucis Vomicæ ʒ j. Aquæ ℥ viij. M. Decoque ad ℥ vj. Adde Tinct. Opii ♏ lx. Fiat Mistura, cujus sumat cochl. j. maximum secundis horis. (In Dysentery. The influence of Nux Vomica in Dysentery is attested by Hagestrom, Hufeland, Richter, Geddings, &c. It may also be given in the form of pills, three to six grains thrice a day.)

℞ Extract. Nucis Vomicæ gr. viij.—xvj. Mucilag. Acaciæ ʒj. Aquæ Distil. ℥ vj. Syrupi Altheæ ℥ j. M. Fiat Mistura. Sumat ℥ ss. secundis horis. (Dysentery. Its use should not be long persevered in, if it fails to give early relief.)

℞ Ol. Tereb. ♏ xv. Aquæ Menth. Pip. ℥ j. M. Fiat Haustus, quartis horis repetendus. (In internal passive Hæmorrhages.)

℞ Tinct. Ferri Mur. (Sesquichlorid.) ♏ x. Aquæ ℥ j. M. Fiat Haustus, tertiâ q. q. horâ sum. (In uterine and vesical Hæmorrhages.)

℞ Zinci Sulph. gr. xij. Myrrhæ Pulv. ℈ ij. Conf. Rosæ q. s. ut fiant Pil. xij. Sumat unam ter die. (In Phthisis or Chronic Bronchitis with excessive expectoration, in Leucorrhœa and Nervous Affections.)

℞ Plumb. Acet., Opii āā gr. vj. Pulv. Sacch. ℈ ij. M. Divide in Pulveres xij. Sumat j. n. et m. (In Colliquative Diarrhœa, and sweating of Phthisis. A glass of barley-water slightly acidified with simple Oxymel may be taken after it, to prevent the formation of the carbonate.)

℞ Plumb. Acet. gr. iv.—xij. Aquæ Distil. ℥ iij. Acid. Acet. Dil. ʒ ij. Aceti Opii ♏ xl. Syr. Papav. ʒ v. Fiat Mist. Sumat cochl. j. ampl. tertiâ q. q. horâ. (In Hæmorrhages from the stomach and intestines, uterus and urinary organs, and lungs.)

℞ Acet. Plumb. ℈ j. Opii gr j.—ij. Pulv. Glycyr. gr. xij. Muc. Acac. q. s. ut fiant Pil. xij. Sum. unam omni horâ. (In the præmonitory Diarrhœa of Asiatic Cholera. If the characteristic vomiting, purging, and spasms already exist, give them every quarter of an hour till relief is obtained, and then gradually increase the intervals at which the dose is given to every third or sixth hours.)

℞ Cupri Sulph. gr. ss. Opii gr. ss. Conf. Rosæ q. s. Fiat Pil. ter quotidie sum. (In Chronic Diarrhœa or Dysentery. The dose of the Sulphate may be gradually raised to two grains at a time, to be taken immediately after food, so as to diminish the risk of irritation of the mucous membrane.)

℞ Alum. Sulph. ʒ j. Decoct. Cinch. ℥ xij. Mellis Rosæ ℥ jss. M. Fiat Gargarisma. (In relaxation of the uvula and fauces.)

℞ Infus. Krameriæ Rad. ℥ vij. Acid. Sulph. Dil. ʒ ij. Syr. Rosæ Gall. ℥ j. Fiat Gargarisma, ope tubuli vitrei utendum. (In relaxation of the uvula. For other gargles, see Stimulants and Tonics.)

℞ Alum. Sulph. gr. viij.—xvj. Aquæ Rosæ ℥ iv. M. Fiat Collyrium. (In chronic stage of Ophthalmia.)

℞ Aquæ Rosæ ℥ vj. Zinci Sulph. gr. xij. M. Fiat Collyrium.

℞ Liq. Plumb. Diacetat. ♏ iv.—viij. Aquæ Distil. ℥ iv. M. Fiat Collyrium.

℞ Liq. Plumb. Diacetat. ʒ ss. Ung. Cetac. ℥ j. M. Fiat Unguentum. (In Ophthalmia Tarsi.)

℞ Liquor. Plumb. Diacetat. ℈ j.—ij. Aquæ Rosæ ℥ viij. Vini Opii ʒ j. M. Fiat Collyrium. (In scrofulous inflammation of the eyelids.)

℞ Plumb. Acetat. gr. xij. Suberis Usti gr. iv. Butyri Recentis ℥ j. M. Fiat Unguent. (Hæmorrhoids.)

℞ Pulv. Gallarum ʒ j. Opii Pulv. gr. xv. Adipis Suillæ ℥ j. M. Fiat Ung. (Hæmorrhoids.)

℞ Aluminis Sulphat. ʒ j. Aquæ ℥ viij. M. Fiat Lotio. (Hæmorrhoids when free from inflammation.)

℞ Aquæ Calcis ℥ j. Olei Olivæ ℥ ij. Camphoræ ʒ ij. M. Fiat Linimentum. (In superficial inflammations, burns, &c.)

℞ Cort. Gallarum ℥ ss. Aquæ ℥ xviij. M. Decoque ad ℥ xvj. (Pro inject. vaginali.)

VI. DIAPHORETICS.

Diaphoretics are medicines by which the cutaneous exhalation is increased; those by which copious sweating is produced are called *Sudorifics*. Medicines of this kind act either by stimulating the exhalants of the skin, or else by augmenting the force of the circulation generally, or by both these ways at once.

Of the first we have examples in the influence of saline diaphoretics, and in that of the large ingestion of aqueous fluids; of the second, in the effects of stimulant diaphoretics, alcoholic liquors, and violent exercise. Tepid diluents and external warmth seem at once to augment the vigour of the circulation, and to relax the mouths of the exhalant vessels. Emetics and nauseants have also a great tendency to relax the cutaneous surface.

Diaphoretics prove beneficial in most acute and chronic disorders by determining to the skin, and perhaps also, (though in a very inferior degree, in consequence of the quantity of drinks, which are generally simultaneously swallowed,) by diminishing the quantity of circulating fluids, and thus in both these ways relieving such internal organs as may be the seat of inflammation or of congestion. Their good effects are particularly well seen in cases where the urinary or alvine excretions are in excess; as also where the mucous membrane or the parenchyma of the lungs is in a congested state, and where the pulmonary secretion is superabundant. Their sanative influence, and especially that of the well-known Dover's powder, in diarrhœa and dysentery is one of the best established facts in therapeutics. When the powder just named tends to produce vomiting, this may generally be obviated by administering it in the form of a pill along with some bitter extract, as that of gentian, for example. Diaphoretics afford a very effectual means of lowering the pulse, and bringing back a healthy condition of the surface, in febrile disorders when unaccompanied by symptoms of a low or typhoid type. To catarrhal and rheumatic fevers they are peculiarly applicable. It is only, however, in the very commencement of fevers that diaphoretics, like emetics, can have any chance of cutting short their progress; and even here, those of a heating kind should generally be avoided. Besides their other modes of action already alluded to, the evaporation from the skin, which follows the operation of a diaphoretic, has a great effect in lowering the temperature.

In the scaly and some other forms of cutaneous eruptions their employment is often followed by very satisfactory results, especially when accompanied by the use of the warm bath or vapour bath in their simple or medicated form; so likewise in diabetes, the body being kept at the same time habitually warmly clothed, and flannel worn next the skin. In dropsy, gout, and secondary syphilis they are often had recourse to with advantage.

In the phlegmasiæ and fevers, and especially when the symptoms of inflammation run high, not only should those of an exciting nature be avoided, but venesection and aperients should be premised in order, in some degree, to cool the surface and relieve the over-distended and imperfectly acting capillaries. The body should be sufficiently, but yet moderately covered, so as to guard against the influence of cool air, without, at the same time, over-exciting the superficial vessels, and so producing a state incompatible with the free exercise of the secerning function. The exhibition of stimulant diaphoretics, whilst the body is perhaps at the same time kept heaped with a profusion of bedclothes, tends to the production of typhoid symptoms and miliary eruptions.

When it is desirable that sweating should be long sustained, wearing a flannel dress next the skin to absorb the moisture and prevent the risk of sudden cooling, is a useful precaution. Bathing the feet in hot water, or assiduously fomenting them with cloths wrung out of the same, form, together with a copious supply of tepid diluents, the best auxiliaries to diaphoretic medicines.

Opium and calomel constitute, in many cases, very valuable adjuncts to several medicines of this class, and especially to ipecacuanha and to antimony. Acidulated drinks should be avoided for some time after a dose of an antimonial diaphoretic has been swallowed, lest vomiting should unnecessarily be induced. Aperients should, of course, scarcely ever be exhibited simultaneously with sweating medicines, both because their effect is in some degree of a contrary nature, tending to impede the action of the latter, as well as because if diaphoresis were to take place, the exposure of the body in the act of getting

up to stool might give rise to dangerous consequences. The use of cold drinks should be avoided, after once the perspiration has begun to flow. The action of the skin being most easily excited during the night and towards morning, these are the periods usually selected for the promotion of artificial perspiration. When sweating has already continued as long as it is desirable, it may generally be checked with safety by wiping the body hastily with flannel cloths, and substituting a fresh supply of well-aired garments and bed-coverings, and gradually exposing the hands and arms to the air.

As in health, so likewise in some chronic dieases, as habitual dyspepsia, for example, active exercise and friction are the best modes of increasing the action of the cutaneous vessels, and so relieving the internal organs. Copious draughts of water, either cold or hot, are often sufficient to excite very profuse sweating without the aid of any more strictly medical agent. Cold affusion is a safe and useful appliance in cases of high fever attended by a firm and frequent pulse, and a hot and dry skin, tending, in a very striking manner, to reduce the violence of the circulation, and to promote perspiration, if the patient be quickly dried and covered up after its use, and adequately supplied with diluent drinks. In the more advanced stages of fever, or where the pulse is somewhat feeble, tepid affusion, or rather sponging, should alone be resorted to, and even these are inadmissible where the skin is moist and relaxed, and the heat not well developed. Cold affusion is inadmissible, even in febrile states, if internal inflammation exist, as well as in advanced pregnancy and during menstruation.

By violent exercise, as well as by the exhibition of diaphoretics, the expected access of an ague fit has been prevented in some instances, and its stages have been moderated in others.

Partial perspirations in fever, the pulse at the same time keeping up, are by no means indicative of an improvement in the case, but rather the reverse.

℞ Potass. Nit. gr. xv. Pulv. Acac. gr. x. Mist. Amyg. ℥ ij. M. Fiat Haustus quartis horis rep. (Acute Rheumatism. Tepid diluents to be at the same time freely administered.)

℞ Potass. Nit. gr. v. Liq. Ammon. Acet. ʒ ij. Aquæ Menthæ Pulegii ʒ v. Vini Antim. Potassio-Tart. ♏ xx. Muc. Acac., Syr. āā ʒ j. M. Fiat Haust. tertiâ q. q. horâ rep. (In inflammatory diseases to relax the skin and reduce the pulse. A few drops of Tinct. Digitalis (♏ iij.—vj.) may occasionally be added with advantage.)

℞ Potass. Nit. gr. xij. Pulv. Ipecac. gr. jss. M. Divide in Pulv. vj. Sumat unum tertiâ q. q. horâ. (A diaphoretic in early infancy.)

℞ Potass. Carb. gr. xviij. Suc. Lim. ʒ iv. Aquæ Distil. ℥ j. Sacch. Albi ℈ j. M. Fiat Haust. tertiis horis repetendus. (When inflammation runs high xx.—xxx. drops of Antimonial Wine may be added to each dose.)

℞ Ammon. Sesquicarb. ℈ j. Aquæ ℥ jss. Syr. ʒ j. M. Fiat Haust. cum Succi Limonis cochl. j. amplo quartis horis repetendus.

℞ Spir. Ætheris Nit. ʒ iij. Vini Ipecac. ʒ j. Mist. Camphoræ ℥ v. Syr. Simp. ʒ iv. M. Fiat Mist. Sumat cochl. ij. ampla tertiis vel quartis horis.

℞ Liq. Ammon. Acet. ʒ iij. Mist. Camph. ℥ j. Syrup. Aurant. ʒ j. M. Fiat Haust. quartis horis repetend. (One of the mildest and most effectual diaphoretics. A few drops of Antimonial Wine, or Wine of Ipecacuanha may occasionally be added, where inflammatory symptoms prevail; or the Aromatic Spirit of Ammonia, if there be much depression.)

℞ Pulv. Antim. gr. xij. Pulv. Trag. Comp. ℈ ij. M. optime. Divide in Pulv. iv. Sumat unum quartâ q. q. horâ. (In Inflammatory Affections after aperients.)

℞ Pulv. Ipecac. Comp. gr. vj. Liq. Ammon. Acet. ʒ iij. Pulv. Acac. gr. x. Aquæ Cinnam. ʒ ix. M. Fiat Haustus sextis horis rep. (Rheumatism, &c.)

℞ Pulv. Ipecac. Comp. gr. xij. Conf. Arom. q. s. ut fiat Bolus horâ somni sum. (Dysentery, Diarrhœa, Rheumatism, &c. Some time after the bolus is taken, tepid diluents should be used freely.)

℞ Pulv. Jacobi Veri gr. viij. Pulv. Ipecac. Comp. gr. xvj. Conf. Arom. q. s. ut fiant Pil. viij. quarum sumat duas tertiâ q. q. horâ.

℞ Antimon. Potassio-Tart. gr. ss. Hydr. Chlor. gr. iv. Opii gr. ij. Conf. Rosæ q. s. Misce optime. Divide in Pil. ij. Sumat unam horâ somni. (Acute Rheumatism.)

℞ Tinct. Guiaci Ammon. ʒ j. Pulv. Trag. gr. xv. Aquæ Cinnam. ℥ jss. M. Fiat Haust. ter die sum. (Chronic Rheumatism.)

℞ Guiaci Gummi Res. gr. x. Pulv. Ipecac. Comp. gr. v. Potass. Nit. gr. x. Conf. Rosæ q. s. ut fiat Bolus horâ somni sum.

℞ Mist. Camphoræ ℥ vss. Tinct. Guiac. Ammon. ʒ vj. Liq. Ammon. Acet. ℥ j. Acet. Opii ʒ j. Syr. Aurant. ʒ v. Fiat Mist. cujus sumat cochl. j. ampl. ter quaterve in die. (Dysmenorrhœa.)

℞ Extr. Aconiti gr. j. Extr. Anthem. gr. xj. Antimon. Sulphureti Præcip. (Oxysulphureti) gr. iv. M. optime. Divide in Pil. iv. Sumat unam mane nocteque. (In obstinate Chronic Rheumatism, &c. Requires caution.)

℞ Mist. Camphoræ ℥ j. Vini Colchici ʒ ss. Liq. Ammon. Acet. ʒ ij. M. Fiat Haust. sextis horis repetendus. (Gout and Rheumatism.)

℞ Rad. Sarsapar. Concis. ℥ iv. Glycyr. ℥ ss. Liq. Calcis O ij. M. Macera per horas xxiv. in vase vitreo optime opere lato, et in loco frigido et obscuro, dein cola. Sumat ℥ iv. ter quaterve in die. (In secondary Syphilis, mercurial affections, debility and impairment of the general health, Scrofula, and Chronic Inflammation of the Bladder. Its use should be continued for several weeks.)

℞ Rad. Sarsap. Conci. ℥ ij. Aquæ Bull. ℥ viij. Stet per horas 24. Cola et adde Liq. Potass. ʒ j —ij. Extr. Glycyr. ʒ j. M. Sumat cochl. iv. ampla ter die. (Scrofula, &c.)

VII. EXPECTORANTS.

Expectorants are medicines by which the excretion from the respiratory organs is promoted. Emetics, nauseants, many stimulants, and some antispasmodics have this tendency. The operation of expectorating medicines is generally somewhat complex, but may, in great part, be resolved into the altering of the quantity of the secreted matter, and the facilitation of its expulsion. The latter object may be effected either by inducing some change in the quality of the pulmonary and tracheal secretions (diminishing the viscid nature of the sputa when excessively glutinous and adhesive, or, on the other hand, augmenting their consistency when unnaturally thin, serous, and frothy), or by stimulating the action of the muscles which cooperate in the act of expectoration, or by both these ways simultaneously. In some states of the respiratory organs, antiphlogistics, diaphoretics, counter-irritants, and other remedies by which the excessive action of the pulmonary capillaries is reduced to the secreting point, are the true expectorants. In others where there is an excessive flow of mucus, impaired aëration of the blood, and a consequent deficiency of nervous and muscular energy, emetics are often very useful in getting rid of the superabundant quantity of fluid already poured out, by means of exciting the vehement action of the expiratory muscles, and thus compressing and emptying all the bronchial ramifications. In these cases too, the stimulating expectorants, such as squill and seneka combined with ammonia, the balsams, myrrh, and the other gum resins, often prove most effectual, along with such measures as tend to sustain the strength, and to alter the mode of action of the vessels by which the mucus is secreted. Of the beneficial effects of both these modes of treatment, when well timed, we may have ample evidence in the management of the suffocative catarrh of the aged, the peripneumonia notha of the older writers.

In pneumonia itself, in its advanced stage, where accompanied by predominant typhoid symptoms, and where it is considered advisable to endeavour to effect a crisis through the medium of expectoration, the stimulant expectorants, such as seneka, are most commonly preferred. In acute and chronic bronchitis and humid asthma, the nauseating expectorants, such as fractional doses of ipcecacuanha or of the tartrate of antimony, are amongst our most valued resources, and may be combined, in many instances, with augmented efficacy, with opiates, antispasmodics, and mercurials. Such combinations tend much to allay irritation, and to relax spasmodic constriction in the air-tubes; as well as in the minute vessels by which their coats are lined. In asthma of a nervous character, and in that of cardiac origin in its advanced stage, expectorants of a depressing kind are often altogether unsuitable, inasmuch as they tend still further to lower the vital energy which is already at too low an ebb.

In infancy, emetics answer particularly well as a means of relieving bronchial inflammation, and their use is attended with much less distress than in after life. In phthisis likewise, they often prove useful palliatives, discharging rapidly a large quantity of secreted mucus, and for a time diminishing the irritation within the lung.

The list of stimulants affords, as we have seen, numerous agents of much topical efficacy in modifying the action of the pulmonary exhalants, such as turpentine and tar vapour, chlorine and iodine; but of all these it may be stated generally, that their influence cannot fail to be highly injurious whenever they produce much excitement. Here watery vapour, either simple or very slightly medicated, as by aromatics, vinegar, tincture of opium, &c. will commonly be much more appropriate.

During the administration of expectorants, a moderate action of the skin should be maintained by means of adequate clothing, lest an oppressive determination of blood to the lungs should defeat their object; whilst, at the same time, all strong diuretics and purgatives should be abstained from, as calculated to impress a false direction on the circulating fluid, or, to speak more correctly, to produce an inconsistent irritation or excitement in an antagonist organ.

℞ Mist. Amyg. ℥ vj. Vini Ipecac., Potass. Carb. āā ʒ jss. M. Sumat cochl. ij. ampla cum uno succi limonis inter effervescentiam tertiâ q. q. horâ.

℞ Vini Ipecac. ʒ j. Syr. Simp. ℥ jss. M. Fiat Mist. cujus detur infanti cochl. j. minimum urgente tussi. (The Syrup of Squills may occasionally be substituted for, or added to the Wine of Ipecacuanha.)

℞ Mist. Amyg. Amar. ℥ vij. Vini Ipecac., Aceti Scillæ āā ʒ jss. Syr. Tolut. ʒ v. Fiat Mistura. Sumat cochl. j. magnum urgente tussi.

℞ Potass. Nit. ℈ j. Pulv. Ipecac. gr. vj. Myrrhæ gr. xij. M. Divide in Pulv. iv. Sumat unum quartâ q. q. horâ.

℞ Pulv. Ipecac. gr. xij. Calomelanos gr. iv. Conf. Rosæ q. s. Divide in Pil. viij. Sumat unam quartâ vel sextâ q. q. horâ. (In acute and extensive Bronchitis accompanied by considerable fever.)

℞ Pulv. Ipecac., Calomelanos āā gr. v. Sacch. Albi gr. x. M. Divide in Pulv. xx. Sumat unam tertiâ q. q. horâ. (In extensive Bronchitis and Pneumonia of very young infants.)

℞ Aquæ Menthæ ℥ j. Muc. Acac. ℥ ss. Liq. Antim. Potassio-Tart. ʒ j.—ij. Syr. Limon. ʒ ij. Tinct. Opii ♏ ij. M. Fiat Mist. Sumat cochl. j.—ij. minim. secundis horis. (In the Pneumonia of very young subjects.)

℞ Extr. Conii ʒ ss. Pulv. Scillæ gr. x. Pulv. Ipecac. gr. v. M. Divide in Pil. x. æquales. Sumat j. bis terve quotidie.

℞ Pulv. Ipecac. gr. xij. Aceti Distil. ʒ xij. Aquæ Menthæ Pulegii ℥ ijss. Fiat Mist. Sumat cochl. ij. ampla quartis horis. (Asthma.)

℞ Amygdal. Amar. Contrit. ʒ j. Potass. Nit. ʒ ss. Pulv. Ipec. ℈ j. Extr. Glycyr. et Muc. Acac. āā q. s. ut fiant Trochisci xxx. Sumat unum secundis vel tertiis horis. (Bronchitis.)

℞ Extr. Opii Aquos. gr. x. Pulv. Ipec. gr. x. Extr. Glycyr. ʒ iv. Sacchari Albi ʒ iv. Muc. Trag. q. s. Divide in Trochiscos octoginta. Sumat unum sæpius in die urgente tussi. (In the latter stages of Bronchitis. Very useful.)

℞ Sodæ Carb. ʒ ss. Vini Ipecac. ʒ j. Tinct. Opii ♏ x. Syr. Tolut. ʒ iij. Aquæ ℥ jss. Fiat Mist. cujus sumat cochl. j. amplum quartis horis.

℞ Tinct. Scillæ ♏ xv. Acid. Nit. Dil. ♏ xv. Extr. Hyosc. gr. iij. Aquæ ℥ jss. M. Fiat Haust. tertiâ quâque horâ ad quartam vicem rep. (Asthma.)

℞ Lobeliæ Inflatæ ʒ x. Spir. Ten. ℥ viij. M. Digere per dies decem et cola. Hujus Tincturæ sumat ♏ x. ad xl., dosibus gradatim auctis. (Expectorant, diuretic, and antispasmodic. In Asthma, Hooping-cough, and Croup. In larger doses (ʒ j.—ʒ ij.) it is emetic; and dangerously narcotic in excessive doses.)

℞ Oxymel. Scillæ ʒ v. Tinct. Camph. Co. ʒ iij. Spir. Æther. Nit. ʒ iv. Infus. Lini Comp. ℥ vjss. Fiat Mist. Sumat cochl. ij. ampla tertiâ q. q. horâ.

℞ Mist. Ammoniaci ℥ vj. Acet. Scillæ ʒ iv. Vini Ipecac. ʒ ij. Tinct. Opii ♏ xl. Aquæ Fœnic. ʒ x. Ft. Mist. Sum. cochl. ij. magna tertiâ q. q. horâ. (Chronic Catarrh. If there be great depression of strength, a drachm of the Carbonate of Ammonia may be added to the mixture, and the Tincture of Squill ʒ ij. substituted for the Vinegar of Squill.)

℞ Mist. Camphoræ ʒ iv. Tinct. Digit. ♏ x. Oxymel. Scillæ ʒ ss. M. Fiat Haust. quartis horis sum. (Chronic Bronchitis grafted on Morbus Cordis.)

℞ Mist. Assaf. ℥ iij. Aq. Menthæ Pip. ℥ ij. Tinct. Scillæ ʒ ij. Tinct. Camphoræ Comp. ʒ ij. Syr. Tolut. ʒ iv. M. Fiat Mist. Sumat cochl. j. amplum tertiis horis.

℞ Myrrhæ Gum. Res. ʒ j. Scillæ Pulv. ℈ j. Gum. Res. Ammoniaci ʒ ss. Ammon. ʒ ss. Extr. Hyosc. ℈ ij. Muc. Acac. q. s. M. Divide in Pil. xl. Sumat ij. ter die. (Phthisis and Chronic Catarrh.)

℞ Assafœt. ℈ j. Pulv. Ipecac. ʒ ss. Scillæ Pulv. gr. viij. Sap. Duri, Syr. Tolut. āā q. s. ut fiant Pil. xvj. Sumat unam quartis horis. (Chronic Catarrh of the aged, Asthma.)

℞ Pulv. Scillæ, Extr. Conii āā ʒ ss. Ammoniaci Gum. Res. ʒ jss. M. optime. Divide in Pil. xxx. Sumat j. quartâ quâque horâ.

℞ Mist. Ammoniaci ℥ iv. Vini Antim. Potassio-tart. ʒ iij. Tinct. Camph. Comp. ʒ v. Syr. Tolut. ℥ j. M. Fiat Mist. Sumat cochl. j. medium urgente tussi.

℞ Decoct. Senegæ ℥ vj. Ammoniaci ʒ ij. Syr. Tolut. ʒ vj. M. Fiat Mist. Sumat cochl. ij. ampla quater in die. (In Pectoral Affections with debility, and excessive secretion of mucus.)

℞ Decoct. Senegæ ℥ j. Liq. Am. Acet. ℥ ss. Syr. Scillæ ʒ ij. Syr. Papav. ʒ ij. M. Sumat ʒ j.—ij. tertiis horis. (For very young infants in the advanced stages of Pertussis and Chronic Bronchitis.)

℞ Mellis, Olei Amyg. āā ℥ j. Suc. Limon. ʒ iv. Syr. Tolut., Syr. Scillæ āā ʒ ij. M. Fiat Linctus. (In common Catarrh.)

VIII. EMETICS.

Emetics are medicines which have a peculiar tendency to excite vomiting in almost all cases, even when given in very moderate doses. There are many other medicines which being of a disagreeable flavour are occasionally rejected by irritable stomachs, or if they are swallowed in considerable quantity; but these are intentionally excluded by the above definition. There is, in fact, scarcely any substance, however simple, which if taken to excess will not cause an inverted action of the stomach. Bitters, when taken largely, approach most nearly in their effects to special emetics. A strong tepid infusion of chamomile rarely fails to turn the stomach, and a weak one swallowed liberally is one of the most usual means resorted to for promoting the action of the class of medicines now under consideration. Tepid water and most other tepid fluids taken rapidly, and in unusually large quantities, are by their sickly flavour and the distension they cause commonly alone sufficient to induce vomiting.

A few minutes after an emetic has been administered, nausea and a peculiar sinking sensation come on, accompanied by paleness, quickness and weakness of pulse, and chilliness, and all this is speedily succeeded by the free evacuation of the stomach, and the establishment of a certain degree of reaction in the system. During the efforts of vomiting, the face is flushed and turgid from the mechanical obstruction to the return of blood from the head. Considerable languor and drowsiness usually succeed to the operation of such medicines; and hence the evening is generally to be preferred for their exhibition: the skin is left in a relaxed and perspiring state, and the pulse for the most part continues, for some time after, feebler than it was before, and any inflammatory symptoms which may have existed, are somewhat diminished in intensity.

Where the vomiting induced is severe, the irritation often extends to the hepatic ducts and liver, and a profuse flow of bile makes its way into the stomach, and comes up along with its other contents, of which an abundant secretion of ropy mucus is commonly a conspicuous one. By this sudden secretion of bile, and the consequent distension of the biliary ducts, as well as by the vehement compression of the abdominal organs, and the general tendency to relaxation, large impacted biliary calculi have sometimes been liberated.

The degree of nausea induced by a medicine is not always proportionate to its emetic influence. Thus the sensation of sickness which ensues upon the use of the sulphate of zinc is very much less oppressive than that caused by the tartrate of antimony, or by tobacco. In quickness of operation also emetics differ very remarkably: thus the sulphates of zinc or of copper act almost immediately; the tartrate of antimony requires a somewhat longer

time; and ipecacuanha longer still, though even this, when the medicine is given in an adequate dose, rarely much exceeds a quarter of an hour; but in certain cases, as for instance after poisons have been swallowed, even the difference of a few minutes is of great practical importance.

There is a great difference in individuals in regard to the facility with which vomiting is excited, and this exists in a still greater degree in respect to different classes of animals, in some of which, from the structure of their stomachs, this action can scarcely, if at all, be induced, as in the horse for example. In persons labouring under mental derangement much stronger doses than ordinary are commonly required.

Many stimulant substances, when freely swallowed, have an emetic tendency, of which we have a conspicuous instance in the infusion of mustard-seed, which is capable of exciting the stomach to action, even when great general and local torpidity exists. Most irritant poisons give rise to severe vomiting. Narcotics on the other hand, if not rejected almost immediately after they have been taken, diminish in a remarkable degree the sensibility of the stomach.

Several emetics, as ipecacuanha, tartrate of antimony, &c. have also a purgative tendency, so that even if they fail of fulfilling the original intention of their exhibition, they often prove useful by acting on the bowels.

To their utility in promoting diaphoresis and expectoration we have already called the reader's attention in the preceding class; they have also a marked influence over the process of absorption, their use having in some instances been almost immediately followed by the disappearance of dropsical effusions, of indolent buboes, and various morbid deposits.

Nauseant medicines, and especially ipecacuanha, are often given, and with great success, for checking internal hæmorrhages, such for example as those from the stomach and intestines, kidneys, bladder, uterus, &c.

On the well-established antiphlogistic efficacy of the tartrate of antimony in pneumonia and acute rheumatism, ophthalmia, and various other inflammatory affections, when given in large doses (as one or two grains in a small quantity of a weak aromatic infusion, repeated every two or three hours, drinks being withheld in the mean time, in order to diminish the chance of its expending its operation on the stomach or bowels), we shall not here dwell, as its beneficial influence does not seem to be by any means necessarily connected with its occasional emetic effect.

Amongst the most common cases in which the action of emetics is called for, are those where the stomach is oppressed by food of indigestible quality, or taken in excessive quantity—intoxication, when there is reason to apprehend that the alcoholic liquors which have caused it have not been fully expelled by the spontaneous vomiting which so commonly ensues— poisoning by acrid or narcotic substances—periodic and bilious headaches—fever in its commencement, to cut short its progress—and ague just before or during the cold stage, to break through the concatenation of morbid actions, and to restore the balance of the circulation—cynanche tonsillaris in its inflammatory stage as well as when abscess has taken place, in which it often affords immediate relief—obstinate diarrhœa — incipient cholera, to act as a general stimulant to the system and to drive the blood more equally through all the vessels, and so equalise the circulation and overcome local congestion—bronchitis, especially if accompanied with excessive mucous secretion, as well as phthisis and asthma. In several of these cases, a great part of the good effect seems attributable to a species of counter-irritant action on a sound portion of the gastro-intestinal mucous membrane.

In infancy emetics are particularly well borne, and prove very effectual in relieving the chest in bronchitic inflammation, hooping-cough, croup, &c. Their use should generally be avoided in diseases of the heart and great vessels, especially in their advanced stage; in cases where a tendency to congestion of the head exists; in hernia; prolapsus of the rectum and uterus; and in the latter

months of pregnancy. When there is a very irritable state of the stomach their employment is obviously counter-indicated, as well in chronic disorders as in fevers; their imprudent administration in such cases often lays the foundation of formidable gastro-enteritic inflammation. The habit of taking them very frequently under almost any circumstances, has a tendency to render the stomach very susceptible, and impatient even of many of the ordinary forms of aliment, and to debilitate both it and the system at large.

When vomiting takes place to excess, it may often be effectually checked by the exhibition of an effervescing draught, an opiate, a couple of drops of the dilute hydrocyanic acid or of creasote in a potion, or by a dose of magnesia combined with aromatics and stimulants.

℞ Pulv. Ipecac. ℈j. Aquæ Menthæ Pulegii ℥jss. M. Fiat Haustus. Statim sum. superbibend. subinde Aquæ Tepidæ vel Infus. Anthemid. Tepidi cyathum.

℞ Antim. Potassio-tart. gr. ij. Aquæ Distil. ℥iv. Fiat Mist., cujus sumat cochl. ij. ampla singulis horæ quadrantibus donec supervenerit vomitus, superbibendo ut supra.

℞ Pulv. Ipecac. gr. xv. Vini Antim. Potassio-tart. ʒij. Aquæ Menth. Sativ. ℥jss. M. Fiat Haustus statim sumendus.

℞ Vini Ipecac. ℥ss. Syr. Simp. ℥ss. Aquæ ℥j. M. Sumat cochl. j. min. om. horâ quadrante ad emesem. (A mild emetic for very young infants. When a more depressing emetic is advisable, the Tartrate of Antimony, in doses of from $\frac{1}{16}$ to $\frac{1}{8}$ of a grain, may be added to each dose.)

℞ Aquæ Distil. ℥j. Vini Ipecac. ℥ss. Liq. Antim. Potassio-tart. ʒij. Syr. Scillæ ʒij. M. Fiat Mistura. Sumat cochl. j. min. sæpe ad emesem. (Emetic for very young infants in Croup, &c.)

℞ Pulv. Ipecac. gr. xij. Aceti Scillæ ʒij. Aquæ Menth. Pulegii ʒx. M. Fiat Haustus.

℞ Sinapis Pulv. ℥ss. Aquæ Tepid. ℥xij. M. Sumat dimidium statim et quod restat post horæ quadrantem si opus. (In cases of diminished sensibility of the stomach, or of general debility, where the depressing effects of ordinary emetics are likely to prove injurious, as in Paralysis, Cholera, cases of poisoning by narcotics, &c.)

℞ Zinc. Sulph. ℈j. Conf. Rosæ Can. q. s. ut fiat Bolus; statim sum. (Applicable to cases where rapid operation of the emetic is desirable, without extreme or long continued nausea, as in Ague, poisoning, &c.)

℞ Cupri Sulph. gr. viij. Aquæ Distil. ℥ij. M. Fiat Haustus Emeticus. (In cases of poisoning by Opium and other narcotics, when the common emetics have failed to excite the stomach to action, and when the stomach-pump is not at hand.)

℞ Ammon. Carb. ℈j. Pulv. Ipecac. ʒss. Tinct. Capsici ʒij. Aquæ Menthæ Pip. ℥iij. M. Fiat Haustus; statim sum. (In cases similar to those last mentioned, of greatly impaired sensibility of stomach and nervous system. N.B. The *stomach-pump* in the great majority of such cases, as well as in dangerous intoxication by ardent spirits, when vomiting has not taken place spontaneously, is a most valuable resource, superseding the necessity of recurring to the employment of these violently irritating emetics.)

℞ Tabaci Fol. ℥j. Aquæ Tepidæ q. s. Contunde simul. Fiat Epithema, epigastrio applicand. (Requires caution; must be removed instantly on the supervention of sickness.)

IX. CATHARTICS.

Cathartics, or purgatives, are medicines which promote the alvine evacuations; those which are very violent in their operation being called drastics, or, from their producing large watery stools, hydragogue cathartics; whilst those of a peculiarly mild action are termed aperients or laxatives.

The effects of purgatives are ascribable partly to their augmenting the secretions from the mucous follicles and exhalants opening upon the inner surface of the intestines, as well as those from the liver and pancreas, and partly to their stimulating the muscular fibres of the bowels to increased peristaltic action. Different kinds of purgatives produce these effects in very different relative proportions, some increasing greatly the liquid secretions, whilst others seem to do little more than propel the fæcal matter already existing in the intestinal tube, only very slightly augmenting, at the same time, the quantity of bile and mucus. Calomel and blue pill again promote the action of the liver in a very

marked manner, as do likewise, though in an inferior degree, rhubarb and colchicum. Some purgatives, as has been already stated in our preliminary remarks on the art of prescribing, exert their influence chiefly on the upper portion of the bowels, and others on the lower; whilst a third set, such as the saline aperients, senna, and castor oil, seem to act on the whole length of the intestinal canal pretty equably.

There are still some other important points of difference amongst purgatives, as, for instance, in regard to the time required for their operation, and the degree of sickness, uneasiness, or pain, which they cause, as well as in respect to the amount of general excitement or irritation in the system which follows their use. Of the several untoward results to which their injudicious employment occasionally gives rise, the most conspicuous are those connected with the incautious exhibition of the stronger kinds, such as calomel, scammony, and colocynth, gamboge, colchicum, croton oil, and elaterium.

The cases in which purgatives are most frequently resorted to are those in which irritating matters are retained in the intestines, or where the habitual alvine discharges are tardy or insufficient, or unnaturally altered in quality. In inflammatory and congestive disorders, in active sanguineous and serous effusions, and in general plethora, they constitute most valuable auxiliaries to other antiphlogistic or depletory and counter-irritant remedies. In fevers, where the secretions are deficient or depraved, they are commonly very freely exhibited in the earlier stages before debility has set in; but, like all other useful remedies, they are very liable to abuse, and since the publication of Dr. Hamilton's valuable work they have, in fact, too often been pushed to extravagant lengths by his less judicious disciples in the treatment of such low fevers as are characterised by predominant alvine irritation or inflammation, and especially as regards their toc liberal exhibition towards the close of such disorders.

During the course and after the subsidence of some of the exanthemata, a pretty free recourse to cathartic medicines is generally advisable: so likewise in chorea and hysteria, and several other nervous and spasmodic affections, where the alvine evacuations are in a morbid state, as is so often the case. In the treatment of mania, purgatives were long trusted to as the sheet anchor, and though it is now well known that their importance was overrated, they are still acknowledged to be very valuable auxiliaries. The disorders, in short, in which this class of remedies has been at one time or other confidently recommended and largely employed, are almost commensurate with the entire list of the nosologist. They have been loudly praised in jaundice, gout, rheumatism, neuralgic affections, and habitual headache, in purpura and cutaneous diseases, in chlorosis and amenorrhœa, in verminous affections, colic from lead and other causes, obstructions of the bowels, liver, &c. and even in dysentery: in these and a vast number of other diseases which we have not space to enumerate, they have been very commonly resorted to in these countries with great boldness and frequent success. There is, however, every reason to believe, that those practitioners who hold a middle course between the excessive and indiscriminate employment of purgatives, towards which the popular prejudice in Great Britain tends, and the timid and too restricted use of them for which our continental neighbours have latterly been notorious, effect at once the greatest amount of good and the least mischief, and are, consequently, the most worthy of imitation. In indigestion, in particular, the abuse of cathartics amongst us has been carried to a fearful length, the sensibility of the mucous membrane being thus frequently almost exhausted, and the nervous system kept in a miserable state of alternate excitement and depression by their diurnal and exaggerated employment. Many a case of dyspepsia and sluggishness of bowels, which diet, exercise, and time, would have gradually subdued, is thus deeply aggravated, and rendered permanent for life, by an impatient and irrational recourse to the daily and unwarrantable irritation of the stomach and bowels by violent drastics; and doubtless, in not a few instances, an inflammatory and even an ulcerated condition of the mucous membrane have been the result,

together with exasperated hæmorrhoids, and painful prolapsus of the bowel. The vulgar notion that the enjoyment of health is impossible where there are not one or more alvine evacuations daily, has given rise to a greater amount of suffering in England than perhaps any other erroneous medical idea of our day. The natural habit of different individuals differs *ab origine* in respect to the frequency with which their bowels ought to be moved, and any attempt to compel all under the same standard, cannot fail to be productive of disagreeable consequences. The temporary stimulus which a purgative imparts to the system, is often mistaken for the feelings of health, and contributes not a little to the perpetuation of the erroneous practice. Thus Lord Byron was tempted to have very frequent recourse to saline aperients, from finding that their operation was followed by an immediate though evanescent rise of spirits, superior to that caused by any vinous stimulant. As long as a person feels well, the mere interruption of the alvine evacuations for a day or two should by no means be considered as invariably affording grounds for the exhibition of opening medicine. By waiting, and trusting to the efforts of nature, and the effects of food of a more laxative quality, the bowels will generally return to their duty very speedily, provided a habit of undue purgation has not already been formed; and even then, recourse for a few weeks to some natural saline mineral water of happy composition, though perhaps of feeble ingredients when taken separately, will often re-establish the muscular tone and secretory power of these parts.

In weakly patients, and pregnant and menstruating females, violent purgation is peculiarly inappropriate: in passive dropsies likewise the employment of energetic cathartics requires great circumspection: in hydrothorax in particular occurring in the aged or debilitated, they are rarely if ever admissible, and have appeared in some instances decidedly to accelerate the fatal termination; and even in those cases of dropsy of the cellular membrane or abdomen, where drastics or hydragogues are called for, they should not be uninterruptedly administered, and the strength will often require to be supported under their use by tonics and stimulants and a light but nutritious diet. When a tendency to hæmorrhoids exists, aloetic purgatives, from their proneness to cause irritation of the lower bowels, are generally improper, and should give way to aperients of the mildest description, such as castor oil in gradually decreasing doses, or olive oil, sulphur, and cream of tartar, or some of the saline mineral waters. In dysentery too, where aperients are required, none but those of the gentlest kind should be ventured on. As to the purgative effects of oil of turpentine, the error of supposing them very violent was till of late years common, and it is now well known to be a medicine of great value and mild operation, especially when given in pretty full doses along with castor oil, or even with sweet oil, by the mouth or in injections, and to be peculiarly serviceable in those cases of low fever where the evacuations are very fetid and unnatural, and meteorism exists, as well as in spasmodic affections, colic, melæna, and worms. From its stimulant nature it is often admissible in cases of fever, where great sinking precludes the use of more debilitating aperients.

Of the methods best suited for correcting the irritating and sickening tendency of some purgatives, we have already spoken in our preliminary remarks. Those of a very potent nature should rarely be given, save in divided doses repeated at moderate intervals, and for the most part are much the better for being united with others of a milder and somewhat dissimilar operation. Calomel or blue pill forms a useful adjunct to many, when only occasionally had recourse to, as they both possess a great power of correcting unhealthy secretions, and are peculiarly applicable where the tongue is white and slimy, the conjunctiva of a yellowish tinge, and the skin arid and discoloured: at the same time, against the habitual use of mercury as an aperient, whether in the diseases of infancy or of adult age, we can scarcely warn the young practitioner too strongly. When our object is to lower excitement and to diminish the quan-

tity of blood circulating in the system, the regular employment of the saline aperients is the most appropriate and least permanently debilitating.

The state perhaps of all others in which the use of purgatives is the most unexceptionable and productive of the most certain relief, is that where, along with an unusual feeling of anorexia, the tongue, broad, flabby, and without redness of its point or borders, is loaded with a white or brownish fur, the abdomen distended but free from acute pain even on pressure, and the urine of a muddy or bilious appearance.

It is not always possible to fix on the precise dose most suitable to a given case, even in respect to the mildest and most used aperients; and, generally speaking, their operation can be most satisfactorily adapted to the object we have in view by administering them in divided doses, at intervals of from two to six hours. Where purgation is necessary, and yet the patient is incapable of swallowing, as in apoplexy and the comatose state induced by narcotic poisons, &c. a drop of croton oil placed on the tongue will often suffice to open the bowels most effectually, or the stomach-pump or enemata may be had recourse to.

In very obstinate obstruction of the bowels purgatives may sometimes be rendered effectual by combination with narcotics, by premising venesection, dashing cold water on the extremities, by giving mercury to salivation, or by the cautious use of tobacco in the form of enemata, or of fomentation, or finally by the employment of the exhausting syringe introduced into the rectum. Where enemata are had recourse to, in such cases, they ought to be of large size and very active ingredients. An emulsion containing turpentine, castor oil, and assafœtida, is often very effectual. We are frequently obliged to employ injections in cases of habitual constipation, where the stomach will not bear, or appears to be weakened by the use of aperients; but the diurnal use of the former is scarcely less to be deprecated than that of the latter, and will at length almost invariably disappoint us. In cases of permanent or mechanical obstruction in the rectum, however, they constitute a valuable resource.

An attempt is here made to group them according to their respective energy. The same purgative however, it must be remembered, acts with a very different degree of force on different individuals, and even on the same individual under different circumstances.

1. *The stronger Purgatives.*

℞ Pulv. Jalap. gr. x. Calomelanos gr. v. Pulv. Arom. gr. ij. M. Fiat Pulvis; statim sum.

℞ Hydr. Chloridi gr. ij. Pulv. Scam. gr. iij. Sacch. gr. ij. Pulv. Zing. gr. ij. M. Fiat Pulvis.

℞ Pulv. Rhei gr. xv. Calomelanos gr. iij. Pulv. Zing. gr. ij. M. Fiat Pulvis.

℞ Pulv. Jalap. gr. xij. Potassæ Bitart. ʒ ss. Pulv. Arom. gr. ij. M. Fiat Pulvis.

℞ Calomelanos gr. iij. Pulv. Scam. Comp. gr. x. M. Fiat Pulvis; bis in septimanâ sum. (In Worms and morbid state of the intestinal secretions; incipient Hydrocephalus, &c.)

℞ Infus. Sennæ Comp. ℥ v. Potass. Tart. ℥ j. Tinct. Sennæ, Tinct. Jalap. āā ʒ iv. Syr. Rhamni ʒ iij. M. Sumat quartam partem statim, et rep. dosis quartâ quâque horâ donec plene respondeat alvus.

℞ Hydrarg. Submur. gr. v. Pulv. Antim. ā gr. iv. Extr. Papav. gr. iij. M. Divide in Pil. ij. horá somni sum. (In this and the preceding formulæ we have used the three synonymes of Calomel promiscuously, as the prescriber ought to be familiar with each.)

℞ Hydr. Chlor. gr. iij. Pulv. Jacobi Veri. gr. iij. Extr. Col. Comp. gr. iv. Extr. Hyosc. gr. ij. M. Divide in Pil. ij. pro dose sum.

℞ Pulv. Jalap. gr. x. Pulv. Rhei gr. v. Calomelanos gr. iij. Pulv. Cinnam. Comp. gr. ij. M. Fiat Pulvis.

℞ Pulv. Jalap., Potass. Tart. āā gr. xv. Sacch. ʒ j. Olei Caryoph. ♏ ij. M. Fiat Pulvis ex aquæ flor. aurantii cyatho sum.

℞ Sodæ Sulph. ℥ ss. Antim. Potassio-tart. gr. j. Aquæ ℥ iv. M. Fiat Haustus Emetico-catharticus.

℞ Sennæ Fol. ℥ ss. Aquæ Ferventis ℔ j. Macera et cola. Adde Sodæ Sulph. ℥ ss. Vini Antim., Potassio-tart. ℥ j. M. Fiat Enema. (In Painter's Colic.)

℞ Vini Colchici Sem. ʒ ij. Magn. Carb. ʒ j. Aquæ Cinnam. ℥ iij. Fiat Mistura, cujus sumat cochl. j. ampl. tertiis horis. (In Gout, an aperient pill having been previously administered.)

℞ Acet. Colch. ℥ ss. Magn. Calcin. ℈ iv. Magn. Sulph. ʒ vj. Syr. Croci ℥ ss. Aquæ Menthæ Vir. ℥ v. M. Fiat Mist., cujus sumat quartam partem sextis horis. (Use as in the preceding.)

℞ Vin. Colch. Cormi ♏xxx. Potassæ Sulph. ʒjss. Sodæ Carb. ℈ij. Aquæ Anethi ℥jss. Tinct. Calumbæ ʒjss. M. Sumat effervescentem c. succi Limon. cochl. j. amplo.

℞ Ol. Croton. Tiglii ♏ij. Muc. Acac., Syr. ā ℥ j. M. Fiat Mist. Sumat partem quartam quartis horis ad effectum.

℞ Ol. Crot. Tig. ♏ij. Micæ Panis gr. viij. Misce optime. Divide in Pil. ij. Sumat unam statim et repetatur post horas sex si opus.

℞ Hydr. Chloridi gr. xij. Pil. Cambog. Comp., Extr. Coloc. Comp. ā gr. xv. Syr. Zing. q. s. M. Fiat Pil. xij. Sumat duas h. s. p. r. n. (In obstinate Costiveness.)

℞ Cambog. Contr. gr. ij.—iij. Sacch. Purif. ℈j. Tere optime simul. Fiat Pulvis tertiâ q.q. h. sum., donec plene responderit alvus. (In Dropsy. Requires caution.)

℞ Pil. Cambog. Comp. Pil. Rhei Co. āā ℈j. Pulv. Scam. gr. xvj. Extr. Jalapæ, Extr. Coloc. Comp. āā gr. xij. Ol. Carui q. s. M. Divide in Pil. xxij. Sumat duas vel tres h. s. et proximo mane capiat misturæ sequentis cochl. ij. vel iij. ampla.

℞ Decoct. Aloes Comp. ℥jss. Infus. Sennæ Comp. ℥ij. Tinct. Sennæ Comp., Tinct. Jalapæ ā ʒiv. M. Fiat Mistura. (In obstinate torpor of the bowels after milder purgatives have lost their influence.)

℞ Elaterii gr. vj. Cambogiæ gr. x. Extr. Aloes Spic., Sagapeni ā gr. xij. Ol. Carui q. s. Fiat Massa in Pil. xij. dividend. Capiat ij. h. s. (In similar cases to the preceding. Such violent drastics can rarely, if ever, be habitually requisite in respect to constipation alone, if there be a due management of diet, air, and exercise. Where the sensibility of the mucous membrane of the intestines has been temporarily exhausted by imprudent purgation, the constipation which ensues is a natural consequence, calling not for renewed excitement, but for temporary repose, to allow time for the parts to recover their susceptibility to the ordinary stimulus of food and drink.)

℞ Elaterii Extracti gr. ij. Mastiches, Extr. Glycyr. ā gr. vj. Misce optime, et divide in Pil. iv. equales. Sumat unam omni nocte. (In dropsical affections, to bring away large watery evacuations. The use of Elaterium requires extreme circumspection.)

℞ Elaterii Extr. gr. j. Pulv. Zing. ℈ss. Ol. Junip. ♏iij. Syr. Rhamni q. s. Fiat Bolus. (In Anasarca, &c. after other remedies have failed.)

℞ Extr. Elaterii gr. j. Calomelanos gr. xij. Pulv. Zing. ʒss. Sacch. ℈ij. Tere optime simul et divide in Chartulas xij. Sumat j. ter in die. (To children of six years old and upwards affected with Dropsy after Scarlatina, milder remedies having failed.)

2. *Milder Purgatives.*

℞ Pulv. Rhei ℈j. Conf. Arom. gr. x. Aquæ Menthæ Pip. ℥jss. M. Fiat Haustus.

℞ Magn. Sulph. ʒvj. Infus. Rosæ Comp. ℥iv. Syr. Zingiberis ʒiij. M. Sumat dimidium statim, et quod restat post horas duas.)

℞ Pulv. Rhei gr. xv. Potass. Sulph. ℈j. Aquæ Menthæ Pip. ℥jss. M. Fiat Haustus.)

℞ Pil. Hydrarg. ℈j. Extr. Coloc. Comp. ʒss. M. Divide in Pil. x. Sumat ij. alternis noctibus, vel p. r. n.

℞ Hydr. Chloridi gr ij. Extr. Coloc. Comp. gr. vi. M. Divide in Pil. ij. statim sum.

℞ Pulv. Rhei, Pulv. Jalapæ ā gr. v. Calomelanos gr. ij. M. Fiat Pulvis; horâ somni sum. et capiat cras mane misturæ sequentis cochl. iij. ampla, tertiis horis repetenda donec commode purgetur alvus.

℞ Infus Sennæ Comp. ℥v. Magnesiæ Sulphat. ℥j. Tinct. Sennæ, Tinct. Jalapæ, Syrupi Zingib. āā ʒiij. M. Fiat Mistura. (The Black Draught of most hospitals, given in divided doses, some hours after an aperient pill, powder, or bolus, to accelerate their operation, in the commencement of many inflammatory affections, &c.)

℞ Extr. Coloc. Comp. ʒss. Pil. Aloes cum Myrrhâ ℈ij. M. Divide in Pil. xvj. Sumat ij. p. r. n. (This and the two following formulæ are suitable to cases of habitual constipation; a state which is however, in the great majority of instances, artificially induced by the abuse of purgatives, injudicious diet, or deficient exercise; and which will often cease spontaneously, on resolutely abstaining for some days from the accustomed aperient.)

℞ Pil. Rhei Comp. ʒj. Pulv. Scam. ʒss. Pulv. Zing. gr. x. Ol. Caryoph. ♏iv. Theriacæ q. s. M. Divide in Pil. xxiv. Sumat i.—ij. p. r. n.

℞ Extr. Coloc. Comp., Castorei ā ʒj. Carb. Sodæ Sic. ℈j. Ol. Carui ♏viij. Saponis q. s. ut fiant Pil. xxx., quarum sumat ij.—iij. bis in septimana.

℞ Extr. Coloc. Co., Pil. Rhei Co. āā ʒss. Calomelanos gr. xij. Ol. Carui ♏v. Syr. q. s. Fiat Massa. Divide in Pil. xv. Sumat i.—iij. horâ somni. (In commencement of febrile affections, or in habitual costiveness, the Calomel being in the latter case for the most part excluded.)

℞ Pil. Rhei Comp. ʒj. Pil. Hydr. gr. vij. Ol. Cinnam. ♏iv. Divide in Pil. xiv. Sumat duas horâ somni.

℞ Aloes Extr. Spic. ℈ij. Myrrhæ ʒj. Extr. Gent., Ferri Sulph. āā ʒss. M. Divide in Pil. xxxvi. Sumat duas nocte maneque (A tonic aperient in Chlorosis, Anæmia, Dyspepsia, &c.)

℞ Pulv. Rhei gr. vj. Potass. Bitart. gr. xij. Pulv. Cinnam. Comp. gr. iij. Sacch. ℈j. M. Fiat Pulv. (A gentle purgative for children.)

℞ Extr. Coloc. Comp. ʒ ss. Opii gr. j. M. Divide in Pil. vj. Sumat unam alternis horis ad effectum. (In Ileus.)

℞ Olei Ricini ʒ vj. Tinct. Sennæ Co. ʒ iij. M. Fiat Haustus. (In Colic and Dysentery. A few drops of Tincture of Opium may be added with advantage in many cases.)

℞ Olei Tereb., Olei Ricini āā ʒ iij. Olei Cajeputi ♏ vj. Magn. Calcin. ℈ j. Aquæ Menth. Pip. ℥ jss. Fiat Haust. (In Typhoid Fevers, to correct the morbid state of the alvine secretions and combat Tympanites.)

℞ Extr. Coloc. Comp. gr. xvj. Pil. Hydr. gr. vj. Extr. Hyosc. gr. viij. Pulv. Capsici gr. ij. M. Divide in Pil. vj. Sumat unam vel duas horâ somni p. r. n.

℞ Elect. Sennæ ℥ ss. Pulv. Jalapæ Comp., Pulv. Rhei āā ʒ j. Syr. Simp. q. s. ut fiat Electuarium, cujus sumat cochl. j. minimum horâ somni p. r. n.

℞ Extr. Aloes Spic. gr. xx. Pulv. Ipec. gr. viij. Pulv. Zing. ʒ ss. Syr. Simp. q. s. ut fiant Pil. xvj. Sumat j. meridie.

℞ Infus. Sennæ Comp., Aquæ Pimentæ āā ʒ vj. Potass. Tart. ℈ iv. Tinct. Jalapæ, Syr. Aurant. āā ʒ j. M. Fiat Haustus aperiens.

℞ Magn. Sulph. ℥ ss. Mannæ ʒ ij. Infus. Sennæ ʒ vj. Tinct. Sennæ ʒ ij. Aquæ Menthæ Vir. ℥ j. Aquæ Distil. ℥ ij. M. Fiat Mistura. Sumat cochl. iij. ampla om. mane et repetatur post horas quatuor si opus. (*Abernethy.*)

℞ Magn. Sulph., Sodæ Sulph. āā ℥ ss. Aquæ Menthæ Vir. ℥ vijss. Vini Antim. Potassio-tart. ʒ j M. Fiat Mist. Sumat cochl. iij. ampla ter die.

℞ Magnes. Sulph. ℥ j. Antim. Potassio-tart. gr. ss. Aquæ O ij. M. Sumat cyathum (℥ iv.) om. horâ donec respondeat alvus.

℞ Potass. Bitart. ʒ ij. Antim. Potassio-tart. gr. j. Aquæ O ij. M. Sumat cyathum secundis horis. (Erysipelas.)

℞ Infus. Sennæ Comp. ℥ iij. Infus. Gent. Comp. ℥ ijss. Liq. Potass. ʒ jss. Tinct. Card. Comp. ʒ ijss. M. Fiat Mistura. Sumat cochl. ij. magna ter in die. (Aperient and stomachic.)

℞ Olei Tereb., Olei Ricini āā ʒ v. Fiat Haustus. (In Puerperal Fever, Tympanites, Worms, Hysteria, &c.)

℞ Infus. Sennæ Co. ℥ iv. Aquæ Carui ℥ ij. Tart. Potass. ʒ ij. Mannæ ʒ j. Misce. Fiat Mist. cujus sumat cochl. j. amplum tertiis horis ad effectum. (Aperient for young infants. *Maunsell and Evanson.*)

℞ Mannæ ℥ ss. Muc. Acaciæ ℥ ss. Syr. Violæ ʒ ij. Aquæ Menth. ℥ j. M. Fiat Mist. Sumat cochl. j.—ij., min. tertiâ q. q. horâ. (For infants in the early months.)

℞ Pulv. Rhei gr. xij. Magnes. ℈ ij. Pulv. Cinnam. gr. vj. M. Divide in Pulv. xij. Sumat unum tertiis horis. (Aperient for an infant under the half year.)

℞ Pulv. Rhei gr. xij. Hydr. cum Cretâ gr. vj. Pulv. Arom. gr. ij. M. Divide in Pulv. vj. Sumat unum tertiâ q. q. horâ. (In Diarrhœa of young infants, with stools of an unnatural appearance.)

℞ Pulv. Scam., Pulv. Rhei, Potass. Sulph. āā gr. x. Pulv. Arom. gr. vj. Tere optime simul. Divide in Pulv. vj. Sumat unum quartâ q. q. horâ ad alvi plenam solutionem. (For young children. Operates mildly.)

℞ Fol. Sennæ ℥ ss. Sodæ Sulph. ℥ j. Aquæ Ferv. O j. Infunde per semihoram et cola. Fiat Enema.

℞ Olei Tereb. ʒ vj. Vitelli Ovi q. s. Infus. Lini ℥ x. M. Fiat Enema.

℞ Colocynth. Pulp. ʒ j. Adipis Præp. ℥ j. M. Fiat unguentum abdom. infricand.

3. *Gentle Aperients, or Laxatives.*

℞ Pulv. Rhei ℥ j. Magnes. Calcin. ʒ iv. Pulv. Zing. ʒ ij. M. Sumat cochl. j. minim. pro re natâ ex Aquæ Menthæ Pip. ℥ j.

℞ Pruni Domesticæ ℔ ss. Sennæ Fol. ℥ j. Caryophyl. Contus. ʒ ss. Sacch. brunei ℥ j. Aquæ Ferv. O ij. M. Macera per horas ij. Cola. Sumat ℥ iv. tertiis horis ad effectum.

℞ Conf. Sennæ ℥ j. Sulph. Loti ʒ iv. Syr. Tolut. q. s. ut fiat Elect. Capiat cochl. ij.—iij. minima om. mane et repetantur tertiis horis donec respondeat alvus. (Hæmorrhoids.)

℞ Potass. Bitart. ℥ j. Magn. Carb., Flor. Sulph. āā ʒ iv. Potass. Nit. ʒ j. M. Divide in Pulv. viij. Sumat unum c. pauxil. mellis om. nocte maneque.

℞ Potass. Bitart. ℥ ss. Sulph. ℥ j. Confect. Piper. Nigri ʒ ij. Olei Carui ♏ vj. Theriacæ ℥ iij. M. Fiat Electuarium. Sumat cochl. j. minimum bis in die. (In Hæmorrhoids.)

℞ Sodæ Potassio-tart. gr. xiv. Rhei Pulv. gr. vj. M. Divide in Pulv. duos. Suma. j. om. mane. (An aperient for infants. The Sulphate of Potass, a favourite remedy of Fordyce, Butter, Pemberton, &c. in Infantile Remittent, may occasionally be substituted advantageously for the Rochelle Salt in the above.)

℞ Cassiæ Fistulæ Pulpæ, Mannæ, Olei Amyg. āā ℥ ij. Aquæ Flor. Aurant. ʒ ij. M. Fiat Elect. Sumat cochl. j. magnum singulis horis ad effectum.

℞ Mannæ ℥ j. Potass. Bitart. ʒ ss. Seri Lactis ℥ vj. M. Sumat semissem statim et quod restat post h. duas.

℞ Olei Amyg. ℥ i. Syr. Simp. ʒ ij. Vitelli Ovi q. s. M. Fiat Emulsio. Sumat statim.

℞ Cassiæ Fistulæ ℥j. Caryophyl. Contus. ℈j. Aquæ Ferv. ℥xij. M. Macera per horam. Sumat quartam partem secundis horis donec leniter afficiatur alvus.

℞ Tamarind. Pulp. ℥ij. Aquæ Ferv. ℔ij. Macera per quartam horæ partem, et sumat pro potu communi. (In inflammatory affections, where a gentle aperient effect is required, Manna, or Cassia Fistula, or Senna, may be added to it if necessary.)

℞ Tamarind. Pulpæ ℥jss. Pulv. Rhei ʒj. Potass. Supertart. ʒij. Ol. Carui ♏ vj. Syr. Rosæ q. s. ut fiat Electuarium. Sumat cochl. j. minim. pro re natâ.

℞ Pulv. Rhei ʒ ss Pulv. Ipecac. gr. vj. Pulv. Zing. gr. xij. Extr. Gent. q. s. M. Divide in Pil. xij. Sumat duas horam unam ante prandium, vel horâ somni.

℞ Pulv. Rhei, Hydr. cum Cretâ ā gr. xij. Pulv. Ipecac. gr. ij. M. Divide in Pulv. iv. Sumat j. alternis noctibus. (Alterative aperient for young infants.)

℞ Olei Ricini ʒiv. Muc. Acac. ʒiij. Aquæ Pimentæ ʒiv. Syr. Tolut. ʒj. Tinct. Opii ♏ vj. M. Fiat Haustus, quartis horis sum. donec soluta fuerit alvus. (Lead Colic, Dysentery, &c.)

℞ Sodæ Potassio-Tart. ʒij. Sodæ Sesquicarb. ℈j.; Aquæ ℥ij. M. Fiat Haustus, cum cochl. j. amplo Succi Limonis inter effervescentiam sum.

℞ Sol. Magn. (in aquâ ope Acidi Carbonici) ℥vj.; Syr. Rosæ ʒvj. M. Fiat Mistura. Sumat cochl. iv. ampla cum uno Succi Limonis in impetu effervescentiæ, et repetatur dosis quartis horis donec soluta fuerit alvus.

℞ Conf. Sennæ ℥jss. Ferri Tart. ℈ij. Syr. Zing. ʒiij. M. Fiat Elect. Sumat cochl. j.—ij. minima h. s. (Mild aperient and tonic combined.)

℞ Sodii Chloridi (salis communis) ℥ss. Decoct. Avenæ ℥x. Olei Olivæ ℥ij. M. Fiat Enema domesticum.

X. DIURETICS.

Including not only such medicines as increase the flow of urine, but also those which tend to subdue irritation or chronic inflammation in the kidneys and bladder.

Diuretics are medicines by which the flow of urine is augmented. This effect may originate in several different ways, viz. either by the direct action of these substances on the organs by which this fluid is secreted; by their influence on the stomach and bowels and its sympathetic transference to the kidneys; and finally by an impression made on the brain and nervous system, of the possibility of which mode of acting artificially on the urinary organs we have collateral proof in the effects of fear and other depressing passions, as well as in that of hysteria and some other nervous disorders, on the kind and quantity of the renal secretion.

That several substances, and especially those of a saline kind, as nitre for example, and some of an organic nature, as the odorous principle in asparagus and mint, the colouring matter in rhubarb, as also turpentine aud cantharides, actually reach the kidneys, we have satisfactory proof; and in respect to such it is probable that when they increase the urinary secretion, this may be in great part ascribed to their direct stimulant action on the nerves and capillaries of the secreting organ. The effect of others again is so rapid, that coupling this with the circumstance of their never yet having been detected in the urine, we are led to suppose that they produce their diuretic effect by either the second or third of the ways above alluded to.

Aqueous fluids, taken largely whilst the surface of the body is kept cool, generally act as diuretics: hence it appears how erroneous was the practice of certain of the older physicians, who prohibited the free use of drinks in dropsies The saline diuretics in particular, if diluents be withheld, would generally irritate the kidneys to a pitch quite incompatible with secretion. If the dose of a diuretic be so large as to produce intestinal irritation, its specific effect on the kidneys is commonly quite lost, of which we have examples in cases where the nitrate of potass, cream of tartar, or turpentine, are given in considerable quantity.

The action of diuretics is often greatly promoted by the previous employment

of antiphlogistics to reduce any inflammatory tendency existing in the organs to which they are particularly directed, or in the system generally. Of the influence of general excitement over the urinary secretion, we have a remarkable evidence in the succession of changes which it displays in the course of common fevers. There is however an opposite state of the system, in which it is to the removal of depression and debility by means of bitters, mineral acids, steel, and other tonics, that we must look for the restoration of the due action of the kidneys, no less than that of the other secreting organs.

Where serous effusions exist in large quantity, any medicines which favour their absorption, and thus bring a sudden accession to the watery portion of the blood, are apt to act as diuretics; hence, probably, in part arises the conspicuous influence of calomel and of blue pill in augmenting the effects of squills and some other agents of a similar nature, though it may also be in a considerable measure ascribed to the stimulation of the minute capillaries and nerves of the kidney, whilst in some cases the cessation of the dropsical symptoms must be attributed to the beneficial changes wrought in inflammatory and organic affections of the heart, liver, and other internal organs.

Of the saline diuretics, though some, as we have seen, reach the kidneys unaltered, others, particularly some of those containing a vegetable acid, undergo decomposition in the primæ viæ, and appear to act chiefly by means of their alkaline bases.

The principal employment of diuretics is in the treatment of the different varieties of dropsy, with the exclusion of the encysted kind, in which they are almost invariably useless and even prejudicial. They are often admissible in cases where the strength is already too far reduced to justify us in venturing on the use of drastic purgatives. The best period for their exhibition is in the day-time, as the rest is thus not interfered with, and the patient should be encouraged, strength permitting, to sit up and keep himself rather lightly clothed, in order to prevent them from expending their influence on the skin; and purgatives should, for the time, be withheld. If diuretics be exhibited in the course of fever, a disease in which the urine is often retained or suppressed, the state of the bladder ought daily to be ascertained, as, from the loss of power of emptying itself, and inconsciousness of its condition on the part of the patient, great and very injurious accumulation of this fluid occasionally takes place. In the inflammatory dropsical effusions which sometimes ensue upon scarlatina, active antiphlogistic measures, as free venesection and purging, are generally much more decisive in their effects than diuretics. It is probable that diuretics are capable of more extensive application in practice than is commonly apprehended. In veterinary practice they are made much use of, and with excellent results, in combatting pulmonary and other internal inflammations, as well as for the purpose of getting the animal speedily into good condition and improving the state of his hide.

The action of diuretics is proverbially uncertain; hence the necessity of having a large number from which to select, and to enable us to try a variety of them in succession. In many of the cases in which they are had recourse to, their effects, even under the most favourable circumstances, are at best but temporary, the watery accumulations speedily recurring, inasmuch as they depend on incurable organic diseases for their source.

Where the dropsy is of a passive kind, or dependent on great general debility of the system, the simultaneous or subsequent exhibition of tonics and stimulants is, as we have already seen, very useful in aiding or confirming the cure.

In cases of gravel and stone diuretics and abundant diluents are often had recourse to in order to render the urine less concentrated, and consequently less irritating, as well as less liable to form deposits.

Under the head of diuretics we have also arranged, for convenience of reference, such medicines as seem to modify the sensibility of the kidneys, bladder, and urethra either by their direct action on those parts to which they are occasionally carried by the circulation, or by their stimulant or tonic in-

fluence on the digestive organs, which being thus enabled more perfectly to fulfil their functions, assimilation of the food is more complete, and consequently less labour remains for the urinary organs, and their secretion is of a less irritating quality.

Of the influence of temperature, and of the condition of the skin over the urinary secretion, we have evidence in its loaded state and diminished quantity during summer and after being long in heated apartments, as also in its augmented bulk and less proportion of saline ingredients in frosty weather. In diseases of the urinary apparatus the importance of suitable clothing, moderate exercise and friction, the occasional use of the warm bath, a mild climate, and such other means as are known to sustain the subsidiary action of the cutaneous vessels, should never be forgotten.

℞ Mist. Amyg. ℔ ij. Potass. Nit. ʒj. Solve. Fiat Emulsio. Sumat cochl. iij. ampla omni horâ.

℞ Potass. Bitart. ʒ ij. Aquæ Ferv. ℔ ij. Cortic. Limon. et Sacch. q. s. ad conciliand. gustum. Sit pro potu communi.

℞ Nit. Potass. gr. x. Bitart. Potass. gr. xv. Pulv. Acac. gr. x. Sacch. ʒss. M. Fiat Pulv. ex hordei decocti tepidi cyatho quartâ q. q. horâ sum. (Dropsy.)

℞ Spartii Cacumin. Concis. ℥j. Aquæ ℔ j. M. Decoque ad dimid. consumpt. et cola.

℞ Colaturæ ℥ vij. Spirit. Æther. Nit. ʒ ij. Syr. Zingib. ʒ vj. M. Fiat Mistura. Sumat cochl. ij. ampla alternis horis.

℞ Junip. Bacc. Contr. ℥ ij. Sem. Anisi Contus. ʒ ij. Aquæ Ferv. ℔ j. M. Macera per horas iij. et cola. Sumat cyathum subinde.

℞ Infus. Cascar. ℥ vj. Spirit. Junip. Comp., Spirit. Æther. Nit. āā ʒj. Confect. Arom. ʒ jss. M. Fiat Mistura. Sumat cochl. ij. ampla ter die.

℞ Potass. Subcarb. ʒj. Infus. Gentian. Co. ℥ vij. Spirit. Junip. Comp., Tinct. Cardam. Comp. āā ʒ iv. Fiat Mistura. Sumat cochl. iij. quartâ q. q. horâ.

℞ Pulv. Jalap. gr. xv. Potass. Bitart. ʒ ij. Pulv. Zingib. gr. v. Oxymel. Scillæ q. s. ut fiat Bolus.

℞ Potass. Bitart. ℥ jss. Junip. Bac. et Cacum. Contr. ℥ ss. Pulv. Jalap. ʒ ij. Oxymel. Scillæ ℥j. Syr. Zing. ℥ ss. Tere bene simul. Fiat Elect. Sumat cochl. i.—ij. ter quotidie.

℞ Sodæ Carb. Exsic. ʒj. Sap. Duri ℈ iv. Olei Junip. ♏ vj. Syr. Zing. q. s. Fiat Massa, in Pil. xxx. dividenda. Capiat tres quotidie. (Renal Calculus, &c.)

℞ Potass. Bitart. ʒ j. Pulv. Scillæ gr. ij. Pulv. Cinnam. Comp. gr. iv. Sacch. ʒ ss. M. Fiat Pulv. ter die sum.

℞ Scillæ Rad. Exsic. gr. xij. Potass. Nit. ʒj. Sacch. ʒj. Pulv. Cinnam. Comp. ʒ ss. M. Divide in Pulv. vj. Sumat unum bis quotidie.

℞ Pil. Scillæ Comp. ℈ iv. Hydr. Chloridi gr. v. Divide in Pil. xx. Sumat duas om. nocte maneque.

℞ Pil. Hydr. ʒj. Pulv. Scillæ ℈j. Opii gr. v Conf. Rosæ q. s. ut fiat Massa, in Pil. xx. dividend. Sumat j. ter die. (Ascites and Anasarca.)

℞ Pulv. Digit., Pulv. Scillæ āā gr. j. Pil. Hydr. gr. iij. M. Fiat Pil., om. mane et vespere sum.

℞ Pulv. Digit. gr. x. Pulv. Scillæ gr. xv. Hydr. Chloridi gr. v. Extr. Gentian. q. s. Divide in Pil. x. Sumat j. nocte maneque.

℞ Infus. Digit. ʒ iv. Potass. Acet. ℈ j. Spirit. Æther. Nit. ʒ j. Aquæ Cinnam. ʒ v. M. Fiat Haust., sextâ q. q. horâ repetend. (In Hydrothorax. To be continued till the urine is increased, unless the pulse, head, or digestive organs, be affected by it, when it should be instantly discontinued.)

℞ Mist. Camph. ℥ jss. Am. Carb. gr. viij. Spirit. Æther. Nit. ʒj. Tinct. Digit. ♏ xx. M. Fiat Haust., bis in die sum.

℞ Tinct. Scillæ ʒ ij. Spirit. Armor. Comp. ʒij. Spirit. Æther. Nit. ʒ iv. Infus. Calumbæ ℥vij. M. Fiat Mist. Sumat cochl. ij. ampla ter quaterve in die.

℞ Acet. Colch. ℥ ss. Potass. Acet. ʒ ij. Aquæ Fœnic. ℥ vij. Spirit. Junip. Comp. ℥ ss. M. Fiat Mist. Sumat cochl. ij. ampla ter die.

℞ Decoct. Senegæ ℥ v. Tinct. Scillæ ʒj. Spir. Junip. Comp. ʒ iij. Syr. Simp. ʒ iv. Spirit. Æther. Nit. ʒ ij. M. Fiat Mistura. Sumat cochl. ij. ampla quartis horis. (In Dropsy, with great debility and oppression of chest.)

℞ Infus. Diosmæ Crenatæ (Buchu) ℥ vij. Tinct. Diosmæ, Tinct. Cubebæ āā ʒ iv. M. Fiat Mistura. Sumat. cochl. ij. ampla ter die. (In Chronic Diseases of the Prostate, Bladder and Kidneys, Gravel, &c.)

℞ Uvæ Ursi ʒ jss. Carb. Sodæ Exsic. ʒ ss. Pulv. Cinnam. Comp. ʒ ss. Conf. Rosæ q. s. Divide in Bolos vj. Sumat unum ter quotidie. (In Chronic Inflammation of the Kidneys and Bladder, Calculous Affections, &c. Three grains of Extract. Conii may occasionally be added with advantage to each dose.)

℞ Uvæ Ursi Fol. ʒ ij. Aquæ Ferv. ℔ ss. Macera per horas tres et cola.

℞ Colaturæ ℥ vijss. Acid. Sulph. Dil. ʒ j. Tinct. Digit. ♏ lx. Syr. Papav. ʒ iij. M. Fiat Mist. Sumat cochl. iij., ampla ter quotidie. (In Chronic Laryngitis and Bronchitis.)

℞ Decoct. Uvæ Ursi, Liq. Calcis āā ℥ iv. M. Sumat cyathum vinosum (℥ ij.) quater in die.

℞ Infus. Pareiræ ℥ viij. Extr. Ejusdem ʒ ij. Tinct. Hyosc. ʒ ij. M. Fiat Mistura. Sumat cochl. iij. ampla ter die. (Chronic Inflammation of the Bladder, Calculous Affections, Rheumatism, &c.)

℞ Infus. Pareiræ ℥ viij. Acid. Nitr. Dil. ♏ xl. M. Fiat Mistura, cujus sumat cochl. iij. ampla ter quaterve in die. (In Calculous Deposit consisting of the triple phosphate, announced by the iridescent pellicle on the surface of the urine.)

℞ Chimaphilæ Umbellatæ (Pyrolæ) ℥ j. Aquæ ℔ ij. Decoque ad ℔ j. Cola. Colaturæ adde Liquor. Carb. Potassæ ʒ ij. Sumat cochl. iv. ampla ter indies. (In Dropsy and Chronic Affections of the Urinary Organs.)

℞ Tinct. Ferri Mur. ♏ xij.; Aquæ Tepid. ℥ j. M. Fiat Haust., omni horæ quadrante repetendus donec supervenerit nausea, aut urinæ fluxus. (In Retention of Urine, Dysury, and Hæmorrhage from the Urinary Organs.)

℞ Tinct. Lyttæ ʒ ij. Tinct. Camph. Co. ʒ ij. Tinct. Cinch. Comp. ℥ ijss. M. Fiat Mist. Sumat infans ♏ xxx. ter die. (In Hooping-cough. The dose may be cautiously increased.)

XII. EMMENAGOGUES.

The measures proper to be employed with a view to the establishment or restoration of the menstrual discharge are as numerous and dissimilar as the varieties of amenorrhœa. For their full consideration we must refer to a former portion of this work where all the forms of this affection are treated of. In most cases it is much more to the management of the general health, the establishment of a sound condition of the assimilative functions and of the nervous system, and bringing vascular system into a natural state, or one equally remote from plethora and from anæmia, than to any medicine supposed to act specially on the uterine organs, that we should look for the removal of this disorder, or, to speak more correctly, of this symptom of disorder.

The means usually resorted to in the asthenic variety of amenorrhœa, to which we must here chiefly confine our attention, are reducible for the most part to general stimulants and tonics, antispasmodics and purgatives. The latter in particular, when combined with bark or iron, are very effectual in some of the more common forms, in which a general torpor of the system is complicated with a remarkably defective action of the stomach and bowels. The use of the pediluvium and warm hip bath, the passing of feeble electrical shocks through the pelvis, and the application of a few leeches to the groin or adjacent parts, so as to favour a determination of blood towards the uterus, are often useful auxiliaries.

℞ Pil. Galb. Comp., Pil Aloes cum Myrrhâ āā ℈ ij. M. Divide in Pil. xx. Sumat duas bis quotidie. (At the same time either of the following preparations of iron may be taken; and at the approach to the menstrual period, two or three leeches applied to the upper part of the thighs, or the tepid hip bath employed, and sinapisms applied to the breasts.)

℞ Quin. Disulph. gr. xij. Pil. Aloes cum Myrrhâ ℈ ijss. M. Divide in Pil. xij. Sumat duas bis quotidie.

℞ Pulv. Jacob. Veri ʒ ss. Guiaci Resin., Pil Aloes cum Myrrhâ āā ℈ ij. Syr. Simpl. q. s. Divide in Pil. xxiv. Sumat duas ter die.

℞ Mist. Ferri Comp. ℥ jss. Aquæ Cinnam. ℥ ss. M. Fiat Haust., ter die sum.

℞ Vini Ferri ℥ j. Tinct. Aloes Comp. ʒ vj. Tinct. Castor. ʒ ij. M. Fiat Mistura, cujus sumat cochl. j. min. ex cyatho Infus. Anthem. ter die.

℞ Pil. Aloes cum Myrrhâ, Pil. Ferri Comp. āā ʒ j. M. Divide in Pil. xxiv. quarum sumat ij.—iij. bis quotidie.

℞ Myrrhæ Pulv. ℈ j. Ferri Sulph. gr. jss. Sodæ Carb. gr. iv. Tinct. Croci ʒ j.; Aquæ Menthæ Puleg. ℥ jss. M. Fiat Haustus, ter die sum.

℞ Sabinæ Fol. Exsic., Pulv. Zing. āā gr. vj. Potass. Sulph. ʒ ss. M. Fiat Pulv., bis in die sum. (A stimulant emmenagogue. Its employment demands much caution, and may generally be dispensed with.) For formulæ containing Hydriodate of Potass, see ALTERATIVES.

℞ Liq. Ammon. ♏ xij. Lactis Tepidi ℥ jss. M. (Pro injectione vaginæ.)

XII. ANTACIDS.

Including Absorbents and Antilithics.

THESE are, as their name imports, medicines for neutralising acidity. The substances which exercise this power in the most direct manner are the fixed and volatile alkalies, either in their simple or in their carbonated state, together with lime and magnesia. These all act, however, for the most part only as palliatives, neutralising the acidity already existing in the stomach or bowels, without in any degree preventing its almost immediate regeneration, whether by secretion or fermentation. To obviate permanently the tendency to the excessive formation of acid, we must have recourse to such measures dietetic and medicinal as may gradually improve the tone of the digestive organs. With this view regular exercise, and the enjoyment of a pure bracing air, are very important, together with temperance in regard to vinous stimulants, abstinence from malt liquors, pastry, made dishes, and crude vegetables. The food, of which a fair proportion should consist of animal substances, should be taken at regular and moderate intervals, as from five to seven hours, inasmuch as both eating too frequently and fasting too long tend in a remarkable degree to weaken the stomach, and cause an extrication of superfluous acid. Over-anxiety of mind, intense and prolonged intellectual exertion, late hours, and all species of dissipations are likewise injurious. Bitters and other tonics, and especially the mineral acids (and above all the sulphuric), in a dilute form, frequently prove very useful in counteracting the morbid tendency in question. We have likewise known great benefit from taking frequently in the course of the day, for a length of time, a teaspoonful of the white of egg beaten up raw.

In the mean time, or till the debilitated state of the stomach has been permanently corrected, the alkalies and earths above alluded to form useful resources. In respect to neutralising power, ammonia stands at the head of them all; magnesia comes next, then lime, and last on the list stand soda and potash. Magnesia is however, in the great majority of instances, deserving of a preference, both on account of its comparatively inert nature rendering the precise adaptation of the dose less important, as well as from its insolubility, causing it to remain longer in the stomach, or till the time for its operation arrives, and finally, from its forming with the acid a compound of gently aperient qualities. This last circumstance renders it very valuable in those frequent cases of chronic dyspepsia in which constipation coexists; as well as for gouty subjects, in whom an open state of the bowels is very important. When there is much flatulence, or it is desirable that the dose should be comprised in as small bulk as possible, the calcined magnesia, and especially Dr. Henry's preparation, is to be preferred. Its solution in carbonated water is a very convenient form of exhibition, and much the least disagreeable to most persons, as well as less apt to give rise to the formation of the concretions in the intestines to which we have already alluded. When acidity gives occasion to troublesome diarrhœa, as is so often the case in early infancy more especially, lime is to be preferred either in the form of chalk (its carbonate), or in that of lime water. When the alkalies are resorted to with a view to correcting acidity, the carbonates, or rather the bicarbonates, ought commonly to be selected, pro-

vided flatulence is not complained of, inasmuch as they are less likely to irritate the mucous membrane. The liquor potassæ is, however, in some cases, much more effectual. Its use requires caution ; but with this it has been carried safely, and with conspicuous advantage, by gradual increase, so high as the fluid drachm, and upwards, at a dose (repeated thrice in the day) in some obstinate cases of scaly diseases of the skin, connected apparently with derangement of the digestive organs. It seems not only to obviate ascescency, but also, when properly diluted, to exercise a considerable power of soothing the irritable mucous membrane.

℞ Liq. Potass. ʒ ij. Liq. Calcis ℥ vj. M. Fiat Mist. M. Sumat cochl. j. vel ij. ampla infestante acido, e jusculi tenuis poculo. (To correct acidity and tendency to the formation of lithic acid deposit in the urine. To be taken in a small cupful of chicken broth, beef tea, flaxseed tea, or infusion of chamomile.)

℞ Liq. Calcis, Lactis Vac. āā ℥ vj. M. Sit pro potu.

℞ Potass. Carb. gr. x. Infusionis Gentianæ Comp. ℥ jss. Tinct. Cascar. ʒ j. M. Fiat Haust., ter quotidie sum. (In Acidity of Stomach, and lithic acid diathesis. Potass and its carbonates are preferable in the latter case to Soda, as the compound they form with Uric Acid is more soluble.)

℞ Liq. Potass. ♏ xx. Mist. Cretæ ℥ ij. Tinct. Calumb. ʒ j. M. Fiat Haust., ter die sum.

℞ Liq. Ammon. ♏ xv. Mist. Amyg. ℥ ij. Tinct. Opii ♏ vj. M. Fiat Haustus, ter die sum. (Acidity of the Primæ Viæ.)

℞ Sodæ Carb. Exsic. ʒ jss. Pulv. Cinnam. Comp. ʒ ss. Sapon. ʒ ss. Balsami Peruv. q. s. ut fiant Pil. xxx. Sumat iij. ter die. (In lithic diathesis, and Chronic Irritation of the Urinary Organs.)

℞ Ammon. Carb. gr. viij. Extr. Rhei gr. viij Syr. Zing. q. s. Divide in Pil. iv. Sumat j. vel. ij. p. r. n. prævalente acid oventriculi.

℞ Magnes. ʒ j. Aquæ Menth. Pip. ʒ xv. Tinct. Aurant. ʒ j. M. Fiat Haustus p. r. n. sum. (Heartburn.)

℞ Magnes. Carb. gr. x. Sodæ Carb. gr. v. Pulv. Zing. gr. iij. Pulv. Glycyr. gr. xij. M. Fiat Pulv.

℞ Magnes. ʒ ij. Pulv. Rhei ℈ ij. Aquæ Cinnam., Aquæ Font. āā ℥ iijss. Spir. Ammon. Arom., Syr. Zing. āā ʒ iv. M. Fiat Mist. Sumat cochl. ij. ampla ter quotidie prius agitatâ phialâ. (Cardialgia, Pyrosis, &c.)

℞ Solut. Magnes. (ope Acidi Carbon.) ʒ xiij. Syr. Aurant. ʒ jss. Tinct. Cardam. Co. ʒ jss. M. Fiat Haust. p. r. n. sumend. (Acidity of Stomach. Magnesia in solution is much less disagreeable to the taste, and less prone to form alvine concretions, than in its pulverulent state.)

N.B.—Acidity of Stomach is often much more effectually combatted by the mineral acids, and especially sulphuric acid, in a very dilute form, than by its more direct chemical antagonists, the alkalies and absorbent earths. (For Formulæ, see STIMULANTS and TONICS.) Opiates have also, as remarked by Cullen and others, a very remarkable power of restraining the secretion of acid, and especially when combined with bitter tonics, as in the following formula of Dr. Osborne:

℞ Tinct. Opii ʒ j. Tinct. Rhei, Tinct. Humuli āā ʒ jss. M. Sumat ♏ xxiv. ter die ex aquæ cochleare j. medio. (It should be taken on an empty stomach.)

For the medicines proper in those cases of Calculus resulting from the predominance of the alkaline diathesis, see the acid mixtures, &c. under the heads of STIMULANTS and DIURETICS.

XIII. LITHONTRIPTICS, OR ANTILITHICS.

MEDICINES exhibited with a view to the removal or palliation of calculous affections scarcely appear to demand a separate place in our classification. It is doubtful, indeed, whether there exist any remedies deserving strictly the title lithontriptics, if we are to understand by it substances capable, with safety, of dissolving stone or gravel within the body. For formulæ by which the symptoms connected with them may be in some degree assuaged, and an attempt made to prevent the continuance of deposit, the reader is referred to antacids and tonics, including the mineral acids, to diuretics, demulcents, and narcotics, or sedatives. For the mode of their application, and especially of that of alkalies and acids, which requires the utmost discrimination in order even to avoid doing harm, the article on calculous disorders in a previous part of this work is particularly worthy of perusal.

The uric acid concretions are the most frequent; and here it is to the alkalies, to lime, and, above all, to magnesia, that we must look for aid. The phosphates of lime and of this earth along with ammonia and magnesia require, on the other hand, the cautious exhibition of an acid. Whatever may have been the original nucleus, the phosphatic diathesis is apt sooner or later to occur. A very great difficulty often arises in practice from the circumstance of the successive layers of the calculus being of different, and even opposite natures. The actual condition of the urine should be almost daily tested, and the treatment modified accordingly.

XIV. REFRIGERANTS.

THESE are medicines which are supposed to be capable of diminishing the temperature of the body without inducing debility. The acids, especially those furnished by the vegetable kingdom, and nitre, have very commonly received credit for such powers. Acidulous drinks certainly tend, in a remarkable degree, to relieve thirst, and so to diminish irritation and feverishness in many acute disorders, but require caution where the mucous membranes of the chest, or of the digestive or urinary organs are inflamed. Cold water and ice are the refrigerants of the most extensive applicability and most certain efficacy. Cold drinks are highly beneficial in many febrile diseases, and cool fresh air is invaluable. The cold affusion produces the most happy results, in simple fevers unattended with internal inflammation, as well as in small-pox and scarlatina, provided the skin be hot and dry, and the pulse quick and strong, and the disease in its early stage. Where, however, internal inflammation coexists, or the pulse is feeble, and the skin cool, or a sensation of chilliness is complained of by the patient, cold affusion is highly improper. In doubtful or intermediate cases, tepid sponging is preferable. In uterine hæmorrhages, the cold dash directed on the hypogastric region is a very powerful remedy; in delirium ferox and raging madness, the dropping of cold water on the top of the head is a most potent sedative, and one requiring great caution in its application, inasmuch as, if pushed too far, it might cause dangerous and even fatal collapse. In inflammation of the brain and its membranes, the application of a bladder filled with pounded ice, or of cloths dipped in cold water, or evaporating lotions, are often productive of much benefit, the body and extremities being kept warm. In a great variety of hæmorrhages, and in inflammations of the skin and of the stomach, and in the case of wounds, the external and internal employment of cold is a precious resource. In hectic, sponging the chest and neck with cold vinegar and water has often seemed to exercise a marked control over the progress of the symptoms in cases of pulmonary disease.

Cold applications generally require to be suspended during the menstrual period, and cold affusion or shower-bath is rarely admissible in advanced pregnancy, except perhaps in those long habituated to its use.

℞ Spir. Vini Rectif. ʒj. Aquæ Font. ℥v. M. Fiat Lotio Vaporans. (To reduce the heat of inflamed parts.)

℞ Ammoniæ Hydrochlor. ʒj. Aquæ Font. ℥v. Spir. Rect. ℥j. M. Fiat Lotio discutiens. (In swelled testicle or other inflammatory tumours.)

℞ Liq. Ammon. Acet., Aquæ Distil., Spir. Rect. āā ℥ij. M. Fiat Lotio. (In Phlegmonous Inflammation.)

℞ Ammon. Hydrochlor. ʒij. Acid. Acet. Dil. ℥vj. Spir. Camphoræ ℥ij. M. Fiat Lotio. (In Sprains and Contusions, and to promote the absorption of ecchymosed blood.)

℞ Liquoris Plumbi Diacet. ʒj. Acid. Acet. Dil. ℥ij. Spirit. Rectif. ℥j. Aquæ Rosæ ℥vij. M. Fiat Lotio.

℞ Liq. Ammon. Acet. ℥vj. Spir. Rosmar. ℥ij. Aquæ ℥xvj. M. Fiat Lotio. (To be applied to the head in the Headach of the earlier stages of Fever, &c.)

℞ Potass. Nit., Ammon. Hydrochlor. āā ℥ss. Aquæ Perfrig. ℔j. M. Fiat Lotio. (To

be applied as above, immediately after its solution, by means of lint or old linen saturated with it, and frequently replaced. If used as a substitute for ice, the proportion of the salts used should be much greater than this, or about as one of each to three of water. The mixture may be made in a bladder and thus be conveniently applied to the head in Fever, or to the tumour in Strangulated Hernia, &c. It should be renewed at short intervals. A very intense degree of cold may also be produced by the sedulous evaporation of ether.)

XV. DEMULCENTS AND EMOLLIENTS.

DEMULCENTS are substances of a mucilaginous, gelatinous, or oleaginous nature, which tend to defend the parts to which they are applied from irritating matters; and at the same time to relax and to soothe inflamed membranes, either by direct contact, or by continuous, contiguous, or remote sympathy. It is almost exclusively in diseases of the mucous membranes of the respiratory, digestive and urinary organs that they are employed.

The jellies and decoctions formed of arrow-root and other similar farinaceous substances constitute amongst the best and least irritating species of nutriment in diarrhœa and dysentery, subacute inflammation of the stomach, and convalescence from various debilitating diseases whilst the digestive powers are still weak. Enemata of starch with or without the addition of an opiate are found often of great service in allaying irritation within the rectum, and in the neighbouring portions of the urinary and genital organs. The decoction of sarsaparilla, which is commonly arranged under the head of diaphoretics, might perhaps with equal propriety, so feeble are its obvious medicinal qualities, be placed here. Liquorice, one of the most useful of the class of demulcents, is sometimes employed with good effect to relieve the heartburn connected with acidity.

Emollients are in their action very similar to demulcents. The term has generally been restricted to relaxants adapted for external application. Heat and moisture conjoined constitute the most effectual emollients, of which we have daily evidence in the happy results of the applications of poultices and fomentations in painful and inflammatory affections, contused wounds, &c.; and oily and mucilaginous additions are sometimes thought to augment their efficacy. Some of the milder liniments and ointments also belong to this class.

℞ Mucilag. Acaciæ ℥ ij. Aquæ ℥ iv. Syrup. Tolut., Aquæ Flor. Aurantii āā ℥ j. Fiat Mistura. Sumat cochl. unum amplum secundâ q. q. horâ. (In irritation of the mucous membranes, either simply, or as a vehicle for narcotics, or to sheath irritating medicines. It may be rendered more agreeable in some cases by acidulating it slightly with lemon juice or sulphuric acid.

℞ Olei Amyg. ℥ j.; Pulv. Acac. ʒ ij. Tere bene simul et adde gradatim Aquæ Distil. ℥ v. Aquæ Cinnam. ℥ j. Syr. Papav. ʒiv. Fiat Mistura. Sumat cochl. j. amplum subinde. (Bronchitis, &c. A couple of drachms of Wine of Ipecacuanha may often be added with advantage.)

℞ Cetacei ʒ ij. Vitel. Ovi j. Syr. Althææ ʒ iv. Aquæ Cinnam. ℥ ss.; Aquæ Rosæ ℥ ivss. Fiat Mistura. Sumat cochl. j. amplum sæpius. (Bronchitis, &c.)

℞ Infus. Lini Comp. O ij.; Potass. Nitr. ʒ j.; Mannæ ℥ j. M. Fiat Mist., cujus sumat cyathum vinos. subinde. (In Gonorrhœa. Slightly aperient and diuretic.)

℞ Camphoræ, Potass. Nitr. āā ℈ j. Pulv. Acaciæ ʒ j. Mist. Amyg. ℥ vj. Fiat Mist. Sumat cochl. ij. ampla tertiis horis. (In Chordee, Strangury, with plentiful dilution.)

℞ Acaciæ Gummi ℥ ss.; Aquæ ℔ ij. Solve. Sit pro potu communi. (In Strangury from blisters, and Dysury from inflammation of the urethra, from whatever cause. It is one of the most common ptisans in the hospitals of France in all inflammatory diseases, especially of the mucous membranes of the stomach and intestines. It may be flavoured with syrup, with bitter almonds, and in some instances also with lemon juice, but not if the urinary organs are in an irritable state.)

℞ Oryzæ ℥ ss. Aquæ ℔ iij. Decoque ad ℔ ij. Sit pro potu. (In Diarrhœa, Dysentery. It may be flavoured with Syrup of Red Rose, or with Aromatic Sulphuric Acid, or com-

bined with the Infusion of Catechu and other astringents.)

℞ Cornu Cervi Rament. ℥ iv. Micæ Panis ℥ j. Aquæ ℔ iij. Decoque ad libras ij. Cola. Adde Syr. Simpl. ℥ ij. Aquæ Cinnam. ℥ iv. M. Sumat subinde cochl. ij. vel iij. ampla. (In Chronic Diarrhœa and the advanced stages of Inflammatory Affections, where a light nutriment is requisite. This is "the white decoction" of the French hospitals, and of Sydenham nearly.)

℞ Carnis Vitulinæ ℥ iv. Aquæ ℔ ij. Decoque ad ℔ jss. Sit pro potu. (Demulcent and slightly aperient. In the irritation of the mucous membrane of the intestines from mercury, &c. Its laxative quality may be increased, if requisite, by the addition of an ounce of Tamarinds, or a grain of Tartrate of Antimony.)

℞ Althææ Offic. ℥ j. Aquæ Bullient. ℔ ij. Syr. Simp. q. s. Sit pro potu, ad libitum. (In Inflammations of the Chest, Abdomen, and especially of the Kidneys and Bladder. "Eau de Guimauve," of the French hospitals.)

℞ Ichthyocollæ ℥ ij. Aquæ ℔ ij. Decoque ad ℔ j. Cola, et adde Lactis Vaccini ℔ j. Sacchari ℥ j. M. Sumat cochl. iij. vel iv. ampla subinde. (Demulcent and Nutritive.)

℞ Decocti Althææ Rad. ℔ j. Liq. Plumb. Diacet. ʒ j.—ʒ ij. M. Fiat Lotio. (In Lichen, Eczema, and Impetigo.)

℞ Furfuris Tritici ℔ iv. Aquæ Frigidi ℔ xij. M. Coque simul, cola, et adde balneo tepido. (To form an emollient bath in acute cutaneous diseases, as Eczema, Impetigo, Lichen, Herpes, &c. The water should not be much above 90°. The patient may continue in it from half an hour to two hours; one or two pounds of isinglass dissolved in water may be substituted if expense be unimportant.

℞ Feculæ Tuber. Solani, Decoct. Rad. Althææ āā q.s. Misce Feculam cum Decoct. pauxil. frigid., dein adde Decocti quod restat, et coque ad spissitudinem idoneam pro cataplasmate. (An excellent poultice in irritable diseases of the skin, applied lukewarm. It does not become sour or rancid.)

XVI. ANTHELMINTICS.

Some of the most important and generally applicable remedies in the treatment of worms (especially the ascarides vermiculares, and lumbricoides) will be found under the head of tonics and purgatives. Of the latter class, the most commonly useful are calomel and jalap in large doses, castor oil, croton oil, rhubarb, aloes, senna, scammony, and gamboge.

Of medicines which seem to exert a special influence over the worms themselves, a few are here subjoined.

℞ Semin. Santonici, et Semin. Tanaceti rude Contus. āā ℥ ss. Pulv. Valer. ʒ ij. Pulv. Jalap. ʒ jss. Sulph. Potass. ʒ ij. Oxymel. Scill. q. s. et fiat Elect. Sumat cochl. j. minimum om. nocte maneque. (Lumbrici and Ascarides. Its use should be continued for five or six days.) (*Bremser*.)

℞ Artemisiæ Santonicæ ℈ j. Hydrarg. Chloridi gr. vj. Pulv. Rhei ʒ ss. Camphoræ gr. xij. Syr. Simp. q. s. M. Divide in Bolos ij. Sumat unum mane, et alterum post horas sex. nisi prius bene dejecerit alvus.

℞ Stanni Pulv. ℥ j.; Extr. Artem. Absinth., Pulv. Jalap. āā ʒ j. Syr. Aurant. q. s. M. Divide in Bolos xij. Sumat unum singulis semihoris donec bene dejecerit alvus. (In Ascarides, Lumbrici, and Tænia.)

℞ Dolichi Pubis Mucunæ ʒ j. Theriacæ ℥ j. M. Fiat Elect. Sumat cochl. j. min. omni mane. (In Lumbrici and Ascarides. A purgative should be given every second or third day.)

℞ Absinthii, Tanaceti āā ʒ iij. Valer. Radicis Tritæ ʒ ij. Cort. Aurant. ʒ j. Aquæ Fervent. ℥ viij. Macera per horam. Cola. Fiat Enema, nocte maneque injiciend. (In Ascarides. Its efficacy is remarkably increased by the addition of half a drachm of the "Ol. Empyreumat. Cornu Cervi," or of a drachm of Chabert's Oil.)

℞ Tinct. Ferri Muriat. ʒ iv. Aquæ ℥ viij. M. Fiat Enema. (Ascarides; a purgative of Calomel and Jalap being administered simultaneously (*Darwall*), and Chamomile Infusion drank thrice a day for a fortnight afterwards.)

℞ Mist. Assafœt., Lactis Vac. āā ℥ iv. M. Fiat Enema, h. s. injic. (Ascarides. Assafœtida in five-grain doses four times a day for two days, followed by a purgative (Rhubarb) on the third day, has also been found useful; as has likewise a starch injection containing half an ounce of Turpentine. Half-drachm doses of Turpentine administered in half an ounce of Mucilage thrice a day for a week has proved very effectual in expelling the Lumbrici of children.)

℞ Ol. Tereb. ℥ j.—ij. Decoct. Hordei Frig. ℥ j. M. Fiat Haustus. (Tænia. The dose may be repeated every morning for three days running, or in persons of delicate frame every second morning. If it do not purge within two hours, a dose of Castor Oil should be administered. A very effectual remedy. It occasionally causes a temporary headach and giddiness, like intoxication.)

℞ Filicis Maris Rad. Contrit. ʒ ij., ex Aquæ

Menthæ cyatho summo mane sum., et post horas duas sumat Bolum purgant., viz. —

℞ Hydr. Chloridi gr. v. Jalap. ℈j. M. Fiat Bolus. (In Tænia. The medicine to be worked off by drinking plentifully of green tea. This was Madame Nouffler's celebrated remedy, save that six grains of Gamboge and twelve of Scammony were given in the Bolus in place of Jalap, and the quantity of Calomel was double that here specified.)

℞ Decoct. Filicis Maris ℥iv. (℥jss. ad ℔ ij.) Æther. Sulph. ʒj. M. Fiat Haust., mane sum., et postea sine mora injiciatur Enema Decoct. Filicis ℥ x. cum Æther. Sulph. ʒij. Post horam adhibeatur Mistura purg., scilicet —

℞ Ol. Ricini ℥ij.; Syrup. Flor. Persic. ℥j. M. (Bourdier's treatment of Tape Worm. An ætherial solution of the oleo-resinous principle in the male fern root, has been found very effectual by Peschier in destroying these parasites. The dose is 30 drops in bread pills, one half of which is taken at night, and the remainder the following morning; a dose of Castor Oil being given an hour after the latter. *Chabert's Oil* is one of the most generally successful remedies in this affection. The following is the formula for its preparation and use): —

℞ Olei Empyreumatici Cornu Cervi ℥ ij. Olei Terebinth. ℥vj. Misce. Stet Mistura per triduum, dein ex retorto vitreo destillentur ℥ vj. Distribue in phialas sex parvas bene obturatas, et in loco frigido et obscuro servandas. Sumat ♏ xv. (ad drachmam unam gradatim aucta) ex pauxil Aquæ Cinnamomi, omni nocte maneque, per septimanas quinque vel sex. (The bowels should be well cleared out with the aperient vermifuge electuary of Bremser, given above, before the use of this oil is commenced, and occasionally during its employment. It seems not only to destroy the Tape Worm, but also to prevent its reproduction in the great majority of cases. Its administration requires caution, though it is much less energetic and dangerous than the "animal oil of Dippel" (the empyreumatic oil obtained from the Hartshorn rectified, &c.), the latter being three or four times as strong as Chabert's Oil. These oils become dark coloured and unfit for use by long keeping and exposure to light, and then require to be re-distilled.)

℞ Pulv. Rad. Granati Cort. ℥ss. Divide in Pulveres vj. Sumat unum omni semihorâ ad sextam vicem. (The employment of the bark of the root of the pomegranate has been recently revived with much success in the treatment of Tape Worm. The last dose should be followed by an active aperient, as Senna and Salts; and the whole treatment may be repeated at the interval of a week, to the third time. It occasionally causes a transient stupor or giddiness, or vomiting. (*Elliotson.*)

℞ Cort. Rad. Punicæ Granati ℥ij. Aquæ ℔ ij. Macera per horas viginti-quatuor. Decoque ad ℔ j. Adde Syrupi Zingiberis ℥j. M. Divide in partes tres. Sumat unam omni semihora ad tertiam vicem, incipiens mane. (It may also be simultaneously exhibited in the form of enema. A large dose of Castor Oil, with Syrup of Lemon, is generally administered the night before.)

XVII. ANTIPHLOGISTIC, ANTISYPHILITIC, ALTERATIVE, AND DEOBSTRUENT REMEDIES.

Under these heads we have collected together, rather with a view to practical utility than in accordance with strict accuracy of scientific arrangement, formulæ for such medicines as exert a peculiar control over the capillaries throughout the system at large, as manifested in the power of restraining inflammation in its acute or in its chronic form, or else in that of promoting the absorption of inflammatory or other abnormal deposits (mercury, antimony, iodine).

To have arranged these under the head of stimulants, or of tonics, as some systematic writers have done, or to separate from the rest the most valuable amongst them (mercury), and place it under the head of sialagogues in a distinct class, thus fixing on one of the least important effects of a medicine as the grounds for its classification, could scarcely be considered as an improvement even in respect to theoretic principles of arrangement, and would assuredly be of much less advantage as to the great object of all medical classification, — aiding the memory by judicious associations of a practical tendency.

℞ Hydr. cum Cretâ ʒ ss. Pulv. Ipecac. gr. x. Pulv. Rhei ℈ ij. Pulv. Cin. Comp. gr. x. Pulv. Sacch. Albi ʒj. M. Divide in Pulv. x. Sumat unum bis terve in die. (Mesenteric disease, &c. A deobstruent for infants.)

℞ Hydrarg. Chlor. ℈ j. Antimon. Potassio-tart. gr. iv. Guiaci Gum. Res. ʒj. Tere optime, et adde Confect. Rosæ q. s., et fiant Pil. xx. Sumat unam omni nocte maneque. (In chronic inflammations of the joints, and of internal organs, and of

the skin, eyes, &c. In many cases a pill every night or second night is sufficient.)

℞ Massæ Pil. Hydr. ℈j. Divide in Pil. xij. Sumat unam ter die. (In Syphilis, Acute and Chronic Inflammation of the Liver, &c.)

℞ Pil. Hydr. Chlor. Comp. ℈ ss. Extr. Sarsæ, et Extr. Tarax. āā ℈j. Divide in Pil. xxx. Sumat duas ter die. (Alterative.)

℞ Hydrarg. Chloridi ℈ ss. Opii gr. v. Conf. Rosæ q. s. Divide in Pil. xx. Sumat unam bis in die. (In Syphilis, Chronic Hepatitis, and subacute inflammation of various organs.)

℞ Hydr. Chloridi ℈ ss. Opii gr. v.; Pulv. Antimon. ℈j. Conf. Rosæ q. s. ut fiant Pil. xv. Sumat unam quartâ q. q. horâ. (In acute inflammation of the viscera, Acute Rheumatism, Synovitis (after blood-letting and aperients). Invaluable in inflammation of the serous membranes more especially. The Antimonial Powder may be omitted, when it deranges the stomach or bowels. A much smaller quantity of Mercury, given at very short intervals, will often salivate very rapidly, and may be trusted to in cases which are not of extreme urgency, and especially where the after-effects of the remedy are a subject of apprehension: thus, a single grain of Calomel will frequently be sufficient for every purpose, as in the following formula of Dr. Law): —

℞ Hydrarg. Chlor. gr. j. Extract. Gentianæ q. s. M. Divide in Pil. xij. Sumat j. om. horâ.

℞ Hydrarg. Bichlor. (Oxymur.) gr. ij. Spir. Rect. ℈ iv. Aquæ Distil. ℥ iijss. M. Fiat Mist. Sumat cochl. unum min. ex cyatho decocti hordei vel aquæ edulcoratæ quotidie. (In Syphilitic Affections, Lepra, &c., the dose may be cautiously increased to two, three, or even four teaspoonsful. It should not be taken on an empty stomach.)

℞ Hydr. Bichlor. gr. iv. Ammon. Bichlor gr. v. Solve in Aquæ Fervent. pauxill. Adde Micæ Panis q. s. ut fiant Pil. xx. Sumat j. quotidie. (Syphilis. It may be guarded, if requisite, with Opium.)

℞ Hydr. Bichlor. gr. j Tinct. Cinch. ℥ ij. Solve. Sumat cochl. j. min. bis die in cyatho Infus. Anthem. (In Scrofula.)

℞ Hydr. Acetatis ℈ ss. Camphoræ Rasæ ℈ ss. Opii gr. x. Syr. Papav. q. s. ut fiant Pilulæ xxx. Sumat unam om. nocte maneque. (Syphilis. May be gradually increased to four or five pills at a dose.)

℞ Hydr. Chlor. ℈ ij. Liq. Calcis ℔ j. M. Fiat Lotio. (Common Black Wash. Applicable to syphilitic ulcerations and irritable sores.)

℞ Hydr. Bichlor. gr. xxv. Liq. Calcis ℔ j. M. Fiat Lotio. (In syphilitic sores requiring to be stimulated.)

℞ Hydr. Binoxidi (Oxidi Rubri) ℈ ss. Adipis Præp. ℥ j. Ceræ Albæ ℈ iv. M. Fiat Unguent. (In Chronic Inflammation of the Tarsi and Conjunctiva, a minute portion being smeared along the edges of the palpebræ, so as to produce an abundant secretion from the Meibomian glands.)

℞ Hydr. Binoxidi gr. v. Zinci Sulph. gr. x. Adipis ℥ j. M. Fiat Unguentum. (In Tarsal Ophthalmia, in scrofulous habits.)

℞ Antim. Potassio-tart. gr. vj. Aquæ Cinnam., Aquæ Distil. āā ℥ viij. Syr. Althææ ℥ ij. M. Fiat Mist., cujus sumat sextam partem secundis horis. (Pneumonia, Acute Rheumatism, &c. After the sixth dose, the medicine is intermitted, except in very severe cases, for seven or eight hours. Where it continues to produce much sickness and purging, three or four drachms of the Compound Tinct. of Camphor may be added to the mixture, or an ounce of the Syrup of Poppies substituted for that of Marsh Mallows. In some instances, it controls the inflammation, without affecting either the stomach or bowels.) (*Laennec.*)

℞ Antimonii Oxysulphureti (Sulph. Antim. Aurat.) gr. x. Flor. Sulphuris ℈ jss. Guiaci Resin., Extr. Conii āā ℈ j. Sacchari Fæcis q. s. Divide in Pil. lx. Sumat tres ter die. (In Chronic Cutaneous Affections.)

℞ Tinct. Iodinii Comp. ♏ x. Aquæ Distil. ℈ j. M. Fiat Haustus, ter die sum. ex Aquæ Saccharatæ vel Decocti Sarsaparillæ cyatho. (In Scrofula, Goitre, Amenorrhœa, Hypertrophy of various organs, Secondary Syphilis, &c. The dose may be cautiously increased to 20 or 30 drops thrice a day, and the Unguent. Iodinii Composit. at the same time applied to the tumours externally, in the case of Bronchocele, Glandular Diseases, &c. Where it causes emaciation, its use must be suspended for a time; so likewise where rapidity of the pulse and palpitations are induced, or cough, loss of sleep, and tendency to cerebral congestion, giddiness and headach, extreme irritability and trembling, or pain in the stomach. Its tendency to produce wasting of the mammæ and testes, when pushed too far, should not be forgotten.)

℞ Potass. Iodidi (Hydriod. Potassæ) gr. iij. Aquæ Distil. ℈ j. M. Fiat Haustus, ter die sumendus. (Syphilitic affections of the bones, and Chronic Rheumatism, &c. in a glass of Decoction of Sarsaparilla, or of sugar and water. The dose may be gradually increased to five or six grains and upwards; but the very large doses in which it is sometimes administered (even drachm doses) seem to be neither safe nor necessary when long continued. Its frequent impurity may account for such large quantities having done less mischief than might have been anticipated. In Periostitis, where it is an object to cut the disease short, scruple doses, guarded if necessary with Tinct. Opii, may be administered thrice a day for a short period.)

℞ Potassii Iodidi ℈ j. Tinct. Digit. ♏ xl. Lactucarii ℈ j. Aquæ Distil. ℥ iij. Aquæ Flor. Aur. ℈ ij. Syr. Althææ ℈ vj. M. Fiat Mist., cujus sumat cochl. j. magnum nocte maneque. (Hypertrophy of the Heart.)

℞ Potassii Iodidi gr. ij. Iodinii gr. j. Aquæ Distil. ℥ viij. M. Fiat Mist. Sumat ter-

tiam partem ter quotidie. (In Scrofula. For children under seven years, the third of the above dose will generally be sufficient, and each draught of it may be sweetened with sugar, just before taking it, but not sooner, as decomposition would ensue. It may be made still more dilute, and used for common drink, where it is to be long continued.

℞ Ferri Iodidi (Hydriodat.) gr. ij. Aquæ Distil. ʒj. M. Fiat Haustus, ex aquæ edulcoratæ cyatho ter die sumendus. (In Scrofula, Chlorosis, Amenorrhœa, Leucorrhœa, Phthisis, Secondary Syphilis, Lepra, &c. the dose may be increased to four grains and upwards. Iodine administered in this form is said to be less liable to accumulate in the system, as it passes off readily by the kidneys; but the facility of the decomposition of Iodide of Iron renders the rapid evolution of an injurious quantity of Iodine possible.)

℞ Ferri Iodidi gr. xxx. Croci Stig. Pulv. ʒj. Sacch. Albi ʒiij. Muc. Trag. q. s. M. Contunde simul, et divide in Pil. xc. Sumat binas vel tres ter quotidie. (Stimulant and tonic properties of Iron and Iodine combined, as in the preceding formula; but the solution is a much more permanent and therefore preferable form.)

℞ Hydr. Iodidi gr. j. Extr. Glycyr. gr. xij. Pulv. Ejusdem q. s. ut fiant Pil. viij. Sumat unam nocte maneque. (In Syphilitic Affections, especially when occurring in scrofulous constitutions. Its use requires great caution. The dose may be gradually increased to seven or eight of the above pills in the day.)

℞ Hydr. Biniodidi gr. j. Extract. Glycyr. gr. xxxij. M. optime. Divide in Pil. xvj. Sumat unam nocte maneque. (In Syphilis. The dose may be cautiously increased to five or six of these pills at a time. Its employment, like that of Corrosive Sublimate, demands extreme circumspection.)

℞ Hydr. Biniodidi gr. xx. Alcohol. ℥jss. M. Fiat Mist., cujus sumat ♏ vj. (ad xx. caute aucta) e cyatho Aquæ Distillatæ bis quotidie. (In obstinate Syphilitic Affections. The ointments of the Iodide and Biniodide of the new pharmacopœia are very energetic stimulants applicable to the above cases and to scrofulous and flabby sores. They should be applied only in very small quantity, and to a very limited surface at a time.)

℞ Plumbi Iodidi gr. iv. Conf. Rosæ gr. xx. Misce. optime. Divide in Pil. xij. Sumat unam nocte maneque. (In scrofulous affections of the glands, joints, &c. The dose may be gradually increased to three or four pills at a time and upwards. The ointment of Iodide of Lead should be simultaneously applied to the tumours externally. It is a very active and valuable preparation, and less apt to inflame the skin than the ointment of the Hydriodate of Potass.)

℞ Potas. Bromidi gr. xij. Aquæ Distil. ℥ iij. Syr. Althææ ℥j. M. Fiat Mistura. Sumat cochl. j. maximum ter die. (Deobstruent and stimulant in glandular affections, enlargement of the spleen and heart, Amenorrhœa, &c.)

℞ Potassii Iodidi gr. vj. Iodinii gr. iij. Aquæ Distil. ℔j. Solve. Fiat Collyrium, quater in die applicand. (Scrofulous Ulceration of Cornea, Inflammation of Conjunctiva, &c. When there is great irritability, a minute quantity of Morphia may be added. The ointments containing Iodine are likewise often rendered much more effectual, by the addition of an opiate. The above solution is also used as a fomentation to scrofulous ulcers, and an injection into fistulous sores.)

℞ Iodinii ʒij.; Potassii Iodidi ℥ss. Aquæ Distill. ℥ viij. Solve. Fiat Embrocatio. (To excite very indolent strumous diseases. It may be used also through the medium of a cataplasm, being mixed in a flax seed poultice, and applied very warm. It acts as a powerful rubefacient, or even as a caustic, if the skin be very susceptible. Lugol applies it to scrofulous diseases of the skin and cellular membrane, tubercles, ill-conditioned esthiomenous ulcers, Ozæna, excessive growths, caries, &c. In Lupus it is one of the very best applications that can be made.

To form a bath the whole of the above solution may be added to about forty gallons of water, in a wooden vessel. These baths should produce a slight rubefacient effect on the skin; and their strength may be somewhat increased or diminished, according to their influence. The patient should remain in the bath about half an hour, every second day; and the temperature should be from 96° to 98°. The Iodine is the active ingredient in these baths, the Hydriodate serving chiefly for keeping it in solution. One third of the above quantity is sufficient for a bath for a child, the strength remaining the same. The solution serves also, when *largely diluted*, for fomenting scrofulous parts, in which we do not wish to produce a very rapid or great increase of action.)

N.B. For formulæ for the exhibition of the Nitric and Nitro-Muriatic Acids and Sarsaparilla in Syphilis, as well as that of Turpentine in Iritis and Rheumatic Inflammation, and that of Tincture of Cantharides and of Arsenic in certain obstinate Chronic Cutaneous Affections, over which they exert a remarkable alterative influence, see previous classes, STIMULANTS, TONICS, and DIAPHORETICS, &c.

XVIII. ALKALOIDS.

Formulæ for certain of the Alkaloids and other active medicinal agents not in the British Pharmacopœias.

Brucina — obtained from the false Angustura Bark; action similar to Strychnine, but about six times weaker. Dose gr. ¼ to gr. vj.

℞ Brucinæ gr. xviij. Alcohol. (36°) ℥j. M. Fiat Tinctura. Sumat ♏ vj. ad ♏ xxx., caute aucta. (Paralysis.)

℞ Brucinæ Pulv. gr. xij.; Conf. Rosæ ʒss M. Divide in Pil. xxiv. Sumat j. omni nocte maneque; gradatim augeatur dosis si opus sit ad Pil. ij. vel iij.

Emetina — obtained from Ipecacuanha, used as an emetic and expectorant; in large doses causes, in consequence of its narcotic properties, stupor and death; has little, if any, advantage over the ordinary preparations of Ipecacuanha. There are two forms of it, the coloured, and the pure or white; the latter being many times (at least four times) as strong as the former. The dose of pure Emetine for an emetic is from gr. ¼ to gr. ij.

℞ Emetinæ Puræ gr. j. Solve in Acido Acetico ♏ x.; adde Aquæ Flor. Aurant. ℥iij. Syr. ℥j. M. Fiat Mist., cujus sumat cochl. j. amplum om. horæ quadrante donec supervenerit vomitus.

℞ Emetinæ Puræ gr. viij. Sacch. Albi ℥iv. Muc. Trag. q. s. Fiat Massa in Trochiscos cc. dividenda. (Each contains 1-25th of a grain of Emetine, a convenient form for children; one every quarter of an hour to the fourth time, or till vomiting supervenes.)

℞ Emetinæ *Coloratæ* gr. iv. Aquæ Flor. Aurant. ℥j. Syr. ℥ss. M. Fiat Mistura, cujus sumat cochl. j. amplum omni semihorâ donec supervenerit nausea.

℞ Emetinæ *Coloratæ* gr. xvj. Syrup. Simp. ℔j. M. Sumat cochl. j.—ij. magna pro dose. (A substitute for Syrup of Ipecacuanha.)

Gentianina — obtained from the root of Gentiana lutea; intense bitter. Dose gr. ij.—iv.

℞ Gentianinæ gr. v. Alcohol. ℥j. Solve. Fiat Tinct., cujus sumat ʒ ss.—ʒj. ex aquæ semicyatho ter quotidie. (A tonic bitter.)

℞ Gentianinæ gr. xvj. Syr. Simpl. ℔j. Misce. Fiat Syrupus, cujus sumat cochl. j.—iij. minima pro dose. (Tonic for children in Scrofula, &c.)

Lupulina — obtained from Humulus lupulus; a bitter tonic; slightly narcotic. Dose gr. ij.—vj. or, in the form of tincture (℥j. Lupuline to ℥ iij. Alcohol.), ♏ x.—xxx.

Salicina. — Antiperiodic; much inferior in efficacy to Quina generally, though it has been known in some instances to succeed after the failure of the latter. Dose gr. ij.—viij.

℞ Salicinæ gr. xij. Extr. Gentian., Pulv. Glycyr. āā q. s. ut fiant Pil. vj. Sumat ij. secundis horis. (In Ague and Neuralgia; and in Dyspepsia, in smaller doses.)

Indigo.

℞ Indigoferæ Disperm. ℥j. Syr. Simp. ℥ ij. M. Fiat Electuarium. Sumat cochl. j. minim. semissem omni nocte maneque. (In Idiopathic Epilepsy. The dose may be gradually increased to three or four drachms of Indigo in the day, and its use continued for several weeks. In over-doses, it produces irritation of the Stomach and bowels, and spasmodic twitchings, like strychnia; the former of which may be guarded against by combination with Dover's Powder. Though it is only in very large doses that it has proved useful, as a matter of precaution we should commence with small ones. It tinges both the stools and urine of a bluish colour, and appears to aggravate the disease at the first.)

Iodidum Strychniæ gr. ⅛ bis quotidie (ad gr. ¼ caute auct.). In similar cases with Strychnia (see before) its use requiring great caution. So also the *Sulphate of Strychnia*, which has been employed in France in doses of 1-20th to 1-12th of a grain; the energy of its action even exceeding that of Strychnia, partly in consequence of its greater solubility.

Iodidum Sulphuris.

℞ Iodidi Sulphuris gr. xij Adipis ℥ ss. M. Fiat Unguentum. (In tubercular affections of the skin (Lupus and Acne), and in Lepra and Tinea.)

Iodidum Barii.

℞ Iodidi Barii gr. iv. Adipis Præp. ℥j. M. Fiat Ung. (Scrofulous tumours. Its employment requires caution.)

Iodidum Zinci.

℞ Iodidi Zinci ʒj. Adipis ℥j M. Fiat Ung. Infricetur ʒj. quotidie.

Iodidum Arsenici.

℞ Iodidi Arsenici gr. iij. Adipis ℥j. M. Fiat Ung. (In Cancerous Diseases, Lupus, &c. Its use requires extreme caution, and should not be had recourse to till after the failure of all other means. It should be applied only in very minute quantity, and never to a large surface at a time.)

℞ Chloridi Zinci ʒj. Farinæ ʒ iv. M (This powder moistened with a few drops of water, forms a caustic paste of great efficacy in Lupus. It is sometimes used of double this strength. When it is intended to act deeply, the cuticle should first be removed by a small blister. It is much less dangerous than the arsenical paste of Fra. Come.)

Cyanidum Potassii—has been used in France, America, &c., as a substitute for Prussic Acid, in doses of gr. ¼ to gr. j. in an ounce of simple syrup, or in a potion twice or thrice a day.

Cyanidum Zinci—gr. ¼ to gr. j. administered in an ounce of simple syrup, as a vermifuge. (*Magendie*.) Also as a substitute for Prussic Acid, in Hooping-cough, Spasm of the Stomach, &c.

℞ Cyanidi Zinci gr. j. Magnes. gr. v. Pulv. Cinnam. Comp. gr. iij. M. Fiat Pulv., tertiis horis sum. urgente spasmo.

Cyanidum Hydrargyri.

℞ Hydrarg. Cyanidi gr. xvj. Adipis ℥ j. Ol. Ess. Limon. ♏ xv. M. Fiat Ung. (In some obstinate forms of Impetigo, accompanied with distressing itching.)

Bromidum Ferri.

℞ Ferri Bromidi, Gum. Arab. Pulv. āā gr. xij. Conf. Rosæ Gall. gr. xviij. M. Divide in Pil. xxiv. Sumat ij. nocte maneque. (Stimulant and tonic. Bromine is an irritating poison; its action resembles that of Iodine. Both it and its compounds have been used in Scrofula and Amenorrhœa, Hypertrophy of the Heart, &c.)

Aurum.—Gold in a state of extreme subdivision, its oxide and its salts, have all, like similar preparations of Mercury, a very powerful influence on the system.

Chloridum Auri.—The Chloride of Gold is an energetic poison. In very small doses it has been found to act as a general stimulant and alterative, like Corrosive Sublimate, but with less tendency to affect the salivary glands. It has been employed in Germany and France in Secondary Syphilis, Scrofula, and Herpetic Affections, in doses from 1-20th to 1-16th of a grain. Its effects must be carefully watched. It should only be had recourse to in very obstinate cases.

℞ Auri Chloridi gr. v. Pulv. Glycyr. ʒ ij. Syr. Simp. q. s. Misce optime. Divide in Pil. c. Sumat unam bis terve quotidie.

℞ Auri Chloridi gr. j. Amyli Pulv. ℈ v. Misce optime. Divide in Pulveres xv. (One of these powders to be rubbed into the gums night and morning.)

Chloridum Auri et Sodii.—This has been more frequently employed in France than the preceding; the dose being from 1-20th to 1-10th of a grain, internally. Also in the form of an ointment (gr. x. to ℥ ss. Adipis), of which about the size of a pea is applied to a small blistered surface, so as to be readily absorbed.

Pilulæ Arseniatis Ferri. (Biett.)

℞ Proto-Arseniatis Ferri gr. iij. Extr. Humuli ʒ ij. Pulv. Althææ (vel Glycyr.) ʒ ss. Syr. Aurant. q. s. M. summâ diligentiâ Divide in Pil. quadraginta octo, quarum capiat unam quotidie. [See the previous cautions as to the mode of exhibition of Arsenic under the head of TONICS.]

N. B. For formulæ for *external use*, as gargles, collyria, lotions, liniments, ointments, baths, &c., see particularly the classes of STIMULANTS, NARCOTICS, ASTRINGENTS, and EMOLLIENTS, &c. For enemata, see PURGATIVES, NARCOTICS, ASTRINGENTS, &c.

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LONDON:
Printed by A. SPOTTISWOODE,
New-Street-Square.